way TRACK and STRUCTURES

What about the concrete tie?
p. 38

November 1959

Longest vertical lift span
p. 32

A Simmons-Boardman TIME-SAVER Publication

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The phenomenal BALLAST REGULATOR, SCARIFIER AND PLOW (Track Patrol), a highly versatile machine adaptable to a dozen or more trackwork jobs, is operated by only ONE MAN. It has proven itself time and time again on America's Railroads, and its acceptance is emphasized by many repeat orders. Here is a partial list of owners of the KERSHAW BALLAST REGULATOR, available in both Standard and Heavy Duty Models.

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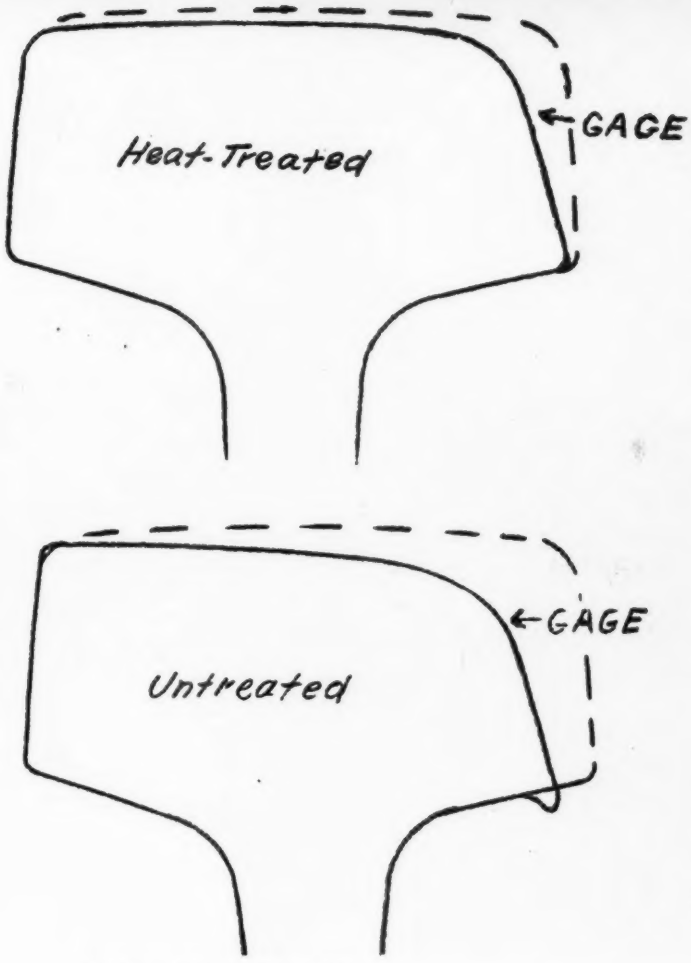

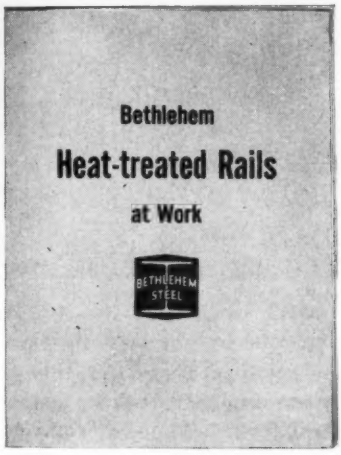

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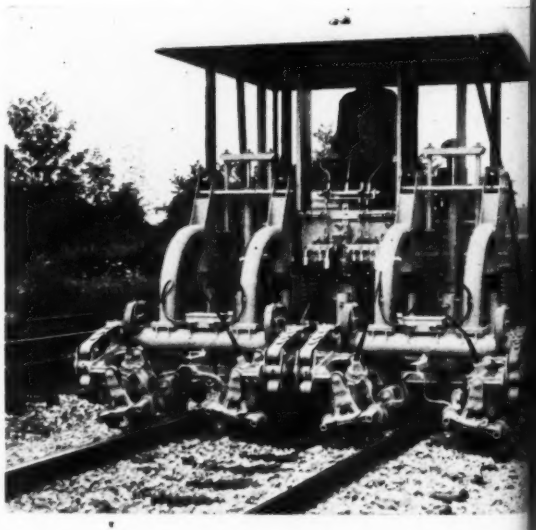

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Railway TRACK and STRUCTURES

NOVEMBER

1959 • Vol. 55, No. 11

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POSTMASTER—SEND FORM 3579 TO EMMETT STREET, BRISTOL, CONN.

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Working on the track at night 23
Tells why several roads are doing track work, especially surfacing, after dark, and describes methods of illumination.

How to cope with present-day M/W problems 26
Pennsylvania's chief engineer, C. J. Henry, explains what his road is doing to counteract the high cost of labor and materials.

Crossties used on bridges 28
By standardizing on 8-ft 6-in ties for use on timber trestles using three-ply chords, the IC is realizing important savings.

New aid for track surfacing 30
Pilot model of bi-scopic track-leveling system is used to make a 10-in raise on a track that was being rehabilitated.

Builds longest vertical lift span 32
B&O's bridge across Arthur Kill boasts a channel span of 558 ft, plus other special features, including roller bearings on cable sheaves.

What about the concrete crosstie? 38
Explains reasons for revival of interest in concrete as a substitute for wood in the manufacture of railroad crossties.

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◀ Don't miss . . .

The Soo Line has moved more than six million cubic yards of material in a program of "streamlining" cuts to minimize snow accumulation. Other advantages, such as better drainage, improved visibility, help justify cost.

. . . in the December issue

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Here's the Fairmont Hy-Rail—a fast, safe, economical way to transport your men, materials and tools to the job site—over the highway or on track. Developed by the original producers of hydraulically operated on-rail attachments, the Fairmont Manually Operated Hy-Rail is not just a "universal kit", but a unit designed and engineered to fit each individual vehicle model.

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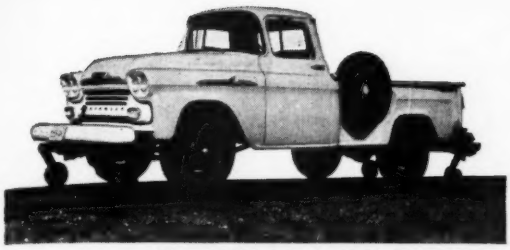
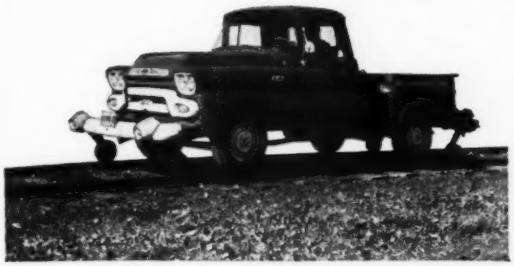
Fairmont Manually Operated Hy-Rail equipment is available as assemblies, mounted on your vehicle, or as a complete unit on many of the most popular ½- and ¾-ton trucks. And it's also available for 1959 Chevrolet Brookwood six-passenger station wagons, for use by supervisory personnel. Call or write for full information.



Chevrolet Pickup Truck with Hy-Rail equipment

Hy-Rail assembly designed for Ford Pickup Trucks



Manually operated Hy-Rail installed on a GMC Truck

Hy-Rail on a Four-Wheel-Drive Willys Jeep Truck

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NEWS ABOUT PEOPLE

BALTIMORE & OHIO—Carmine R. Procassini, field engineer at New York, has been promoted to assistant division engineer at Tompkinsville, Staten Island, N. Y., succeeding **Norman L. Ziegler** who has been promoted to division engineer there. Mr. Ziegler succeeds **George B. Farlow** who has retired after more than 48 years of service. **Griffith Ray,** resident engineer at Pittsburgh, Pa., has been promoted to assistant division engineer at Connellsville, Pa.

CANADIAN NATIONAL—J. E. R. Lagace, assistant engineer at Quebec, Que., has been promoted to assistant division engineer at the same location, succeeding **Gilles Fortin** who has been promoted to assistant engineer, district, also at Quebec. **B. J. Ethier,** assistant engineer at Cochrane, Ont., has been promoted to assistant division engineer there.

CENTRAL OF GEORGIA—James G. Watwood, superintendent of structures and material at Macon, Ga., has been promoted to division engineer at Savannah, Ga., succeeding **Simon Fogarty, Jr.,** who has been transferred to Columbus, Ga. Mr. Fogarty succeeds **Ferrell Dodgen** who has resigned and has accepted the position of mechanized gang foreman.

CHESAPEAKE & OHIO—W. M. S. Dunn, staff engineer at Huntington, W. Va., has been promoted to staff assistant to chief engineer—system, at the same location. **R. L. Milner,** staff assistant to chief engineer, has been promoted to transportation assistant at Huntington, W. Va., succeeding **R. Snell,** retired.

DENVER & RIO GRANDE WESTERN—W. H. Freeman, who has been on leave of absence for the past 11 months during which time he served as chief engineer of the Venezuelan National Railways, has returned to active service as locating engineer with headquarters at Denver, Colo. Mr. Freeman was serving as engineer of track at the time he was granted a leave of absence.

ELGIN, JOLIET & EASTERN—John R. Boyer has been appointed supervisor of track at South Chicago, Ill.

ERIE—Frank A. Roberts has been appointed assistant valuation engineer at Cleveland, Ohio, succeeding **Edward O. Higgins,** retired. **Stanley M. Bielski,** assistant to superintendent of construction at Cleveland, has been promoted to assistant superintendent of construction, succeeding **Wendell R. Swatosh,** retired.

P. B. Schneck, track supervisor at Huntington, Ind., has been transferred to Lima, Ohio, succeeding **William H. Leatherman** who has retired after more than 47 years of service.

GULF, MOBILE & OHIO—William G. Stubblefield, regional engineer at Mobile, Ala., has been promoted to principal assistant engineer there, succeeding **James R. Harris** who has been promoted to assistant chief engineer, also at Mobile. Mr. Harris succeeds **James V. Johnston** who has retired after 45 years of service.

LACKAWANNA — Robert F. Bush, engineer maintenance of way at Hoboken, N. J., has been appointed chief engineer there, succeeding **George A. Phillips** whose retirement was announced in the October issue.

MISSOURI PACIFIC — George H. Morley, roadmaster at Navasota, Tex., has retired after 38 years of service. **Joseph F. Smith,** roadmaster at Little Rock, Ark., retired recently.

NORFOLK & WESTERN — James Y. Neal, principal assistant engineer at Roanoke, Va., retired recently after 53 years of service.

ROCK ISLAND—J. C. Hefner, track supervisor at Dallas, Tex., has been promoted to roadmaster at Wichita, Kan., succeeding **C. H. Bailey** who has returned to his former position as maintenance gang laborer at Dover, Okla.

ROSCOE, SNYDER & PACIFIC—Jack Collins, Jr., has been appointed trainmaster, with jurisdiction over train movements, maintenance of way and shops.

RUTLAND—Norman P. Fortin has been appointed assistant chief engineer. He was formerly resident engineer with the Vermont State Highway Department.

SANTA FE—W. R. Wilson, assistant engineer at Chicago, has been promoted to assistant bridge engineer, system, there, succeeding **Walter E. Robey** who has been promoted to bridge engineer, system, also at Chicago. Mr. Robey succeeds **Clifford H. Sandberg** who has been promoted to chief engineer, Eastern Lines, at Topeka, Kans., succeeding **Harold E. Wilson** who has been promoted to assistant chief engineer, system, with headquarters at Chicago.

SEABOARD—J. F. Chandler has been appointed assistant engineer of construction at Richmond, Va.

SOO LINE—Henry Bauer, assistant engineer, valuation section, at St. Paul, Minn., retired August 31.

Biographical Briefs

Lonnie R. Hall, 53, who was recently promoted to engineer track of the Burlington at Chicago (*RT&S*, Sept., p. 10), was born at Wellsville, Mo. He entered the service of the CB&Q in 1924, serving in various positions until 1931 when he was promoted to track supervisor. Mr. Hall was further advanced to roadmaster in 1945 and to assistant engineer track, Lines West, at Omaha, Neb., in 1954. He was serving in the latter capacity at the time of his recent promotion.

Harold E. Wilson, 55, who was recently promoted to assistant chief engineer, system, of the Santa Fe at Chicago (announced elsewhere in this issue), was born at Rockwall, Tex., and received his higher education at the University of Texas. Mr. Wilson entered the service of the Santa Fe in 1922 as a chainman at Wellington, Kans. Two years later he was granted a leave of absence to attend the University of Texas, following which he returned and was appointed rodman at Amarillo, Tex. He subsequently served as transitman, inspector, assistant engineer, general foreman bridges and buildings and water service, roadmaster, division engineer and district engineer. From 1942 to 1946 he served with the United States Army Corps of Engineers in Africa, Italy, France and Germany. In 1950 he was granted a leave of

(*Continued on page 59*)

Robert F. Bush
Lackawanna

Harold E. Wilson
Santa Fe

C. H. Sandberg
Santa Fe

Walter E. Robey
Santa Fe

W. R. Wilson
Santa Fe

Lonnie R. Hall
Burlington

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UREABOR can prove to be your most practical way of keeping any area weed-free! It offers all the features you want in a weed killer... convenience, safety, economy, and lasting effectiveness. With this granular dust-free material, one easy application—dry—at low rates of 1 to 2 lbs. per 100 sq. ft. gives you full season control.

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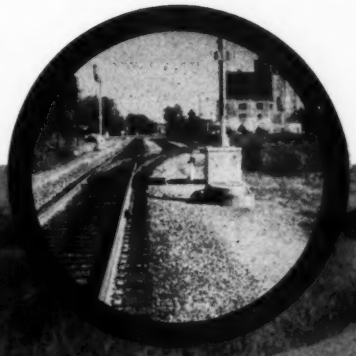

Control of vegetation for a full year in areas such as this can now be accomplished for as little as 30¢ per 100 sq. ft.

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1. Heel of anchor grips rail base edge.
2. Platform provides full rail base contact.
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FAIR rail anchors can be reapplied many times without loss of holding power... Get the complete T-POWER story...Write for descriptive literature.

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STRIKING FACE provides a perfect target for fast, accurate application . . . **OVERDRIVE STOP** assures proper application — everytime. Custom manufactured to fit all types of rail regardless of condition.

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Railway TRACK and STRUCTURES

NEWS NOTES . . .

. . . a résumé of current events throughout the railroad world

Estimated net income of Class I railroads for August was down two-thirds—$81 million to $26 million—from August last year. An AAR statement also shows that the estimated net for this year's first eight months was $365 million, up $79 million from the $280 million reported for the same period of 1958. The poor showing in August was attributed to the strike of steel workers.

Several thousand employees are expected to attend a railroad workers' rally in Chicago November 6 with AFL-CIO President George Meany as the headline speaker. This is said to be an outgrowth of a recent AFL-CIO action in San Francisco pledging support to the railway unions in their current dispute with management.

The practice of many labor unions of using members' dues for political purposes, regardless of the wishes of the individual members, will be reviewed by the United States Supreme Court. A Georgia court previously had ruled this practice to be unconstitutional. The Supreme Court's decision will be based on a case originally brought by six employees of the Southern, who objected to a union shop agreement signed by the railroad in 1953. Another case to be reviewed by the U.S. Supreme Court involves the question of whether a strike to enforce stabilization-of-employment demands can be enjoined on the ground that such demands do not relate to wages, rules and working conditions as defined by the Railway Labor Act.

Railroad employment dropped to 797,195 in mid-September—a decrease of 2.74% from August and a decline of 5% from a year ago—according to the ICC's Bureau of Transport Economics and Statistics.

Special low rates to increase passenger business seem to work. An increase of about 50% in the number of passengers carried was reported by the North Western on its Chicago-Twin Cities trains as a result of its experimental bus-level passenger fares. To learn if this rock-bottom pricing will hold up even during the off-peak winter season, the C&NW has extended these rates to Feb. 28, 1960. Another road which is generating new business with special low rates is the B&O. Its Slumbercoach service permits a traveler to ride in a room having private toilet facilities between Baltimore and Chicago for the price of a coach ticket plus $6. The Slumbercoach plan is now being extended with the cooperation of the Missouri Pacific for service between Baltimore-Washington and San Antonio, Tex.

Merger of the Norfolk & Western and the Virginian, with December 1 as the target date, was approved by the Interstate Commerce Commission. The merger, which was unopposed, will result in estimated savings of $12 million a year. N&W President Stuart T. Saunders, who will head the merged system, hailed the decision as reflecting "a farsighted viewpoint on the part of the Commission and a sympathetic interest in solving one of the major problems which confront the railroad industry today and that is the elimination of duplicating and unneeded transportation facilities and services."

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BEFORE THE 1960 WEED SEASON!

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Against the emergence of weeds and grasses

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ALEXANDRIA, VA.
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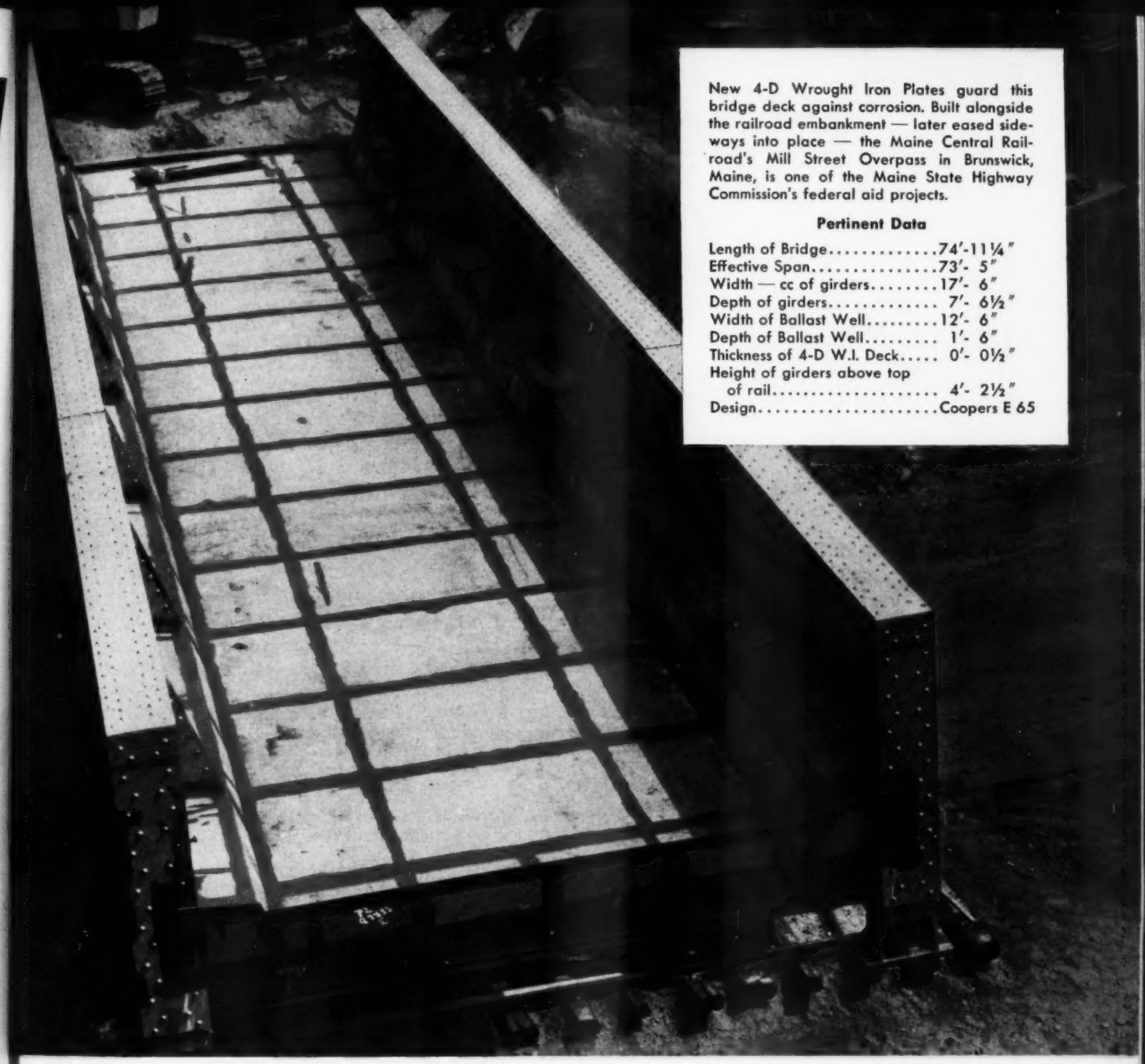

New 4-D Wrought Iron Plates guard this bridge deck against corrosion. Built alongside the railroad embankment — later eased sideways into place — the Maine Central Railroad's Mill Street Overpass in Brunswick, Maine, is one of the Maine State Highway Commission's federal aid projects.

Pertinent Data

Length of Bridge	74'-11¼"
Effective Span	73'- 5"
Width — cc of girders	17'- 6"
Depth of girders	7'- 6½"
Width of Ballast Well	12'- 6"
Depth of Ballast Well	1'- 6"
Thickness of 4-D W.I. Deck	0'- 0½"
Height of girders above top of rail	4'- 2½"
Design	Coopers E 65

4-D Wrought Iron bridge deck plates discourage corrosion — permit shallow floor depth design

The Maine Central realizes a number of advantages using ballast bridges with 4-D Wrought Iron deck plates. On their recently completed Mill Street Overpass, this type of construction permitted reduction of floor depth to a minimum.

4-D Wrought Iron's unique composition — glasslike iron silicate fibers entrained in a pure base metal — makes it extremely corrosion-resistant. It can withstand considerable fatigue stresses. Moreover, its self-fluxing properties enable welders to produce sound welds with ease.

In applications like this, where plates are subject to vibration and severe corrosive attack from coal and refrigerator car drippings and run-off water, 4-D Wrought Iron is more than equal to the occasion. The use of this metal is all the more important because regular maintenance is so difficult in ballast construction.

These advantages account for the increasing trend to 4-D Wrought Iron deck plates in ballast bridges used in highway grade crossing eliminations.

4-D Wrought Iron serves successfully in a number of other railway applications. *Wrought Iron for Railroads* tells which ones and why. Write for a copy. A. M. Byers Company, Clark Building, Pittsburgh 22, Pennsylvania.

BYERS 4-D WROUGHT IRON

Corrosion costs you more than Wrought Iron

Lewis Thomas—a great loss

With the passing of Lewis Thomas on October 13 the railway supply industry suffered a severe loss. His absence from the railway scene will be felt not only because of the positions of responsibility he held, but also because his integrity, industry and character set a shining example for all who came in contact with him.

Railway men knew him primarily because of his position as general sales manager of the Q&C Company. Men in the supply industry knew him mostly because of his work with several associations of supply companies. All were impressed by his charitable attitude, his capacity for getting things done and his unerring judgment.

At the age of 75, when most men have long since retired, Lew Thomas was still carrying a prodigious load. Not only was he continuing in his full-time sales position but he was shouldering heavy responsibilities with the Association of Track and Structure Suppliers and the National Railway Appliances Association. As director of exhibits of both associations it was his responsibility to handle the innumerable details involved in arranging their periodic exhibitions. He was also executive secretary of the ATSS and assistant secretary of the NRAA.

Where Lew Thomas was there is now a great void. It will not be easy to find capable persons willing to assume the heavy burdens this quiet, mild-mannered man carried with apparent ease. But the greatest void is in the hearts of those with whom he worked and lived. Only they can have a full realization of the degree to which he possessed those rare qualities of dedication and willingness to serve that are the mark of a truly great man.

The M/W man's stake in featherbedding issue

Maintenance of way departments have a big stake in the current campaign of the railroads against featherbedding. This wasteful practice affects M/W departments in two ways:

(1) By artificially inflating operating expenses it reduces the amount of money available for M/W allotments.

(2) By taking a sizable bite out of allotments after they have been made, especially for track work, it causes further shrinkage of the funds available for productive use.

It might be said that, for maintenance departments, this is taxation without representation, and double taxation at that. As for the overall problem of featherbedding, the M/W officer can only hope that the railroads will achieve some degree of success in their negotiations with the operating brotherhoods. In that event he may expect that some of the savings will be used to beef up maintenance appropriations.

Of more direct concern to the M/W officer is the kind of featherbedding that actually skims off part of his allotment. This is the money that is paid in the form of wages to operating personnel whose presence is required on some types of track-mounted equipment, whether they are needed or not.

The funds that are thus paid to train and engine crews literally come out of the pockets of the maintenance department. On most roads it is money that is desperately needed for productive work. Yet this form of featherbedding has prevailed for so many years and has become so deeply entrenched that most maintenance men seem to take it for granted, like death and taxes.

The efforts that are made to avoid or minimize this expense are largely for the purpose of circumvention. That is, they seek to eliminate the need for operating personnel either by doing the work under certain conditions, such as on "dead" track, or by the use of equipment, including off-track machines, that cannot be interpreted as requiring the use of train crews. There is no intention here to disparage these efforts; they have been productive of substantial savings to the railroads and where they involve the use of off-track equipment the purpose is at least partly to avoid interference from passing trains. The point is that the union agreements have frequently forced the adoption of practices that would not otherwise be considered.

Obviously a better solution would be to revise the agreements to eliminate the need for using trainmen where they are not actually required. On this point maintenance men have generally maintained a hands-off attitude. Doubtless this viewpoint had its origin in the conviction that there wasn't much that maintenance men could do in this sphere.

Perhaps the time has now come to discard this passive approach. The railroads have launched an offensive against featherbedding. There is no form of featherbedding more objectionable or costly than that forced on maintenance departments by agreements with the operating unions. There may never be a better time than right now for M/W officers to campaign for revision of these agreements.

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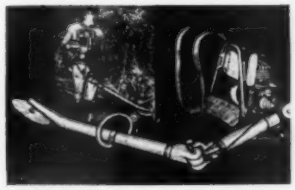

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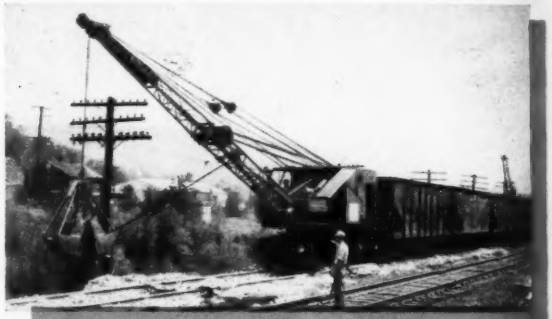

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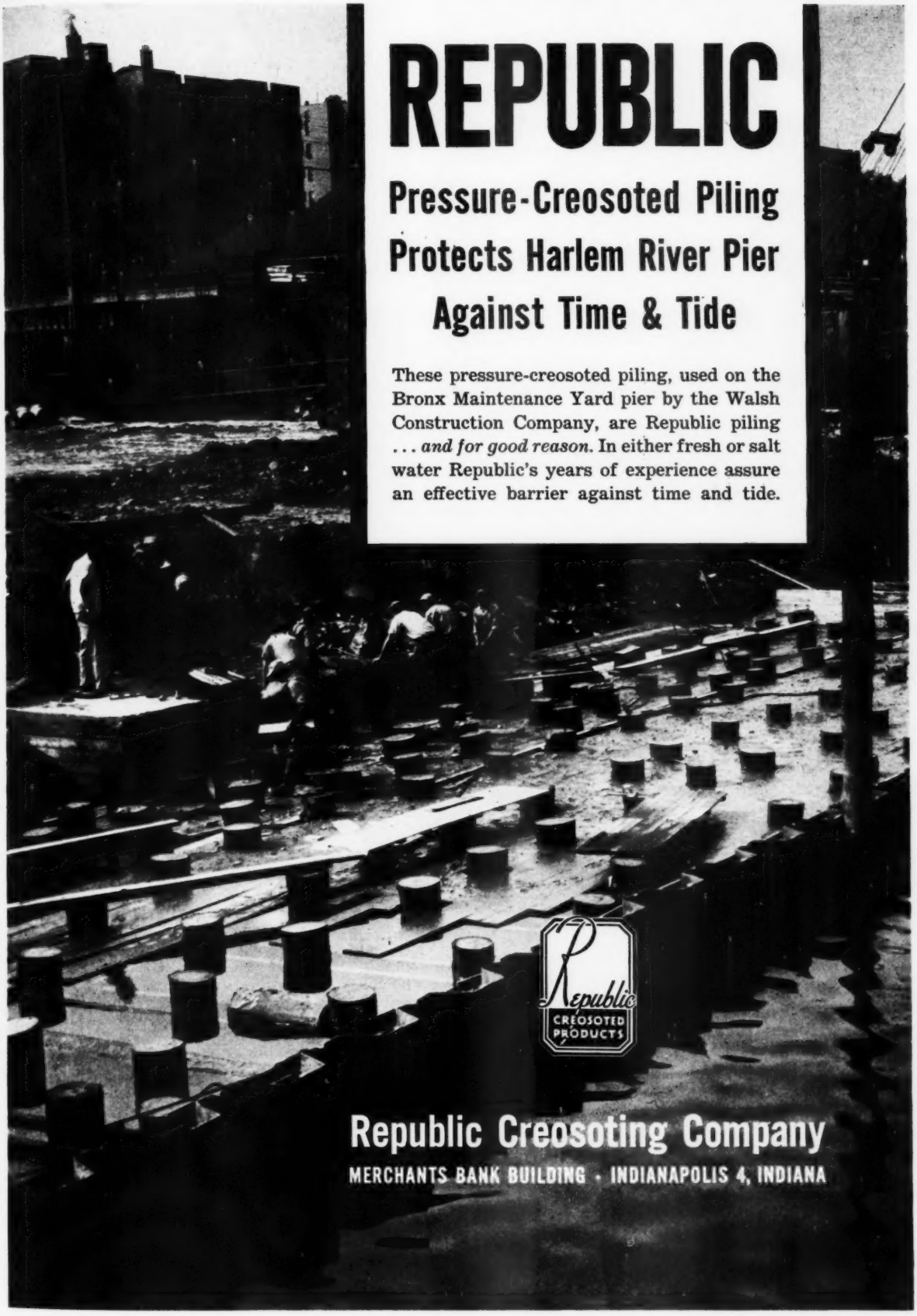
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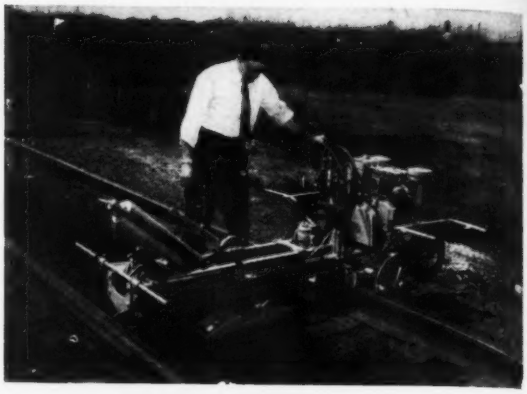

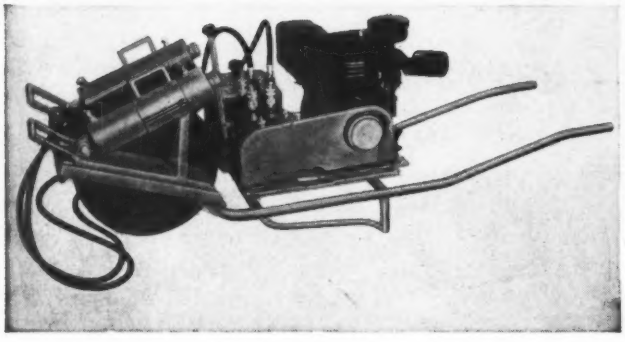

Upper left—Model P-O gasoline engine powered Hydraulic Track Liner operating two hydraulic rams.

Upper right—Model P-O gasoline engine powered Hydraulic Track Liner operating attachment with double flanged track rollers, adjustable for any height and weight of rail. Set-off wheels optional.

Lower left—Model P-O gasoline engine powered Hydraulic Track Liner and two hydraulic rams mounted on wheelbarrow type frame that can easily be operated or transported by one man.

Lower right—Model S-P Liner has fold-up outrigger, detachable dolly that carries cylinder for quick portability. Control valve is right on the cylinder for easy one-man operation.

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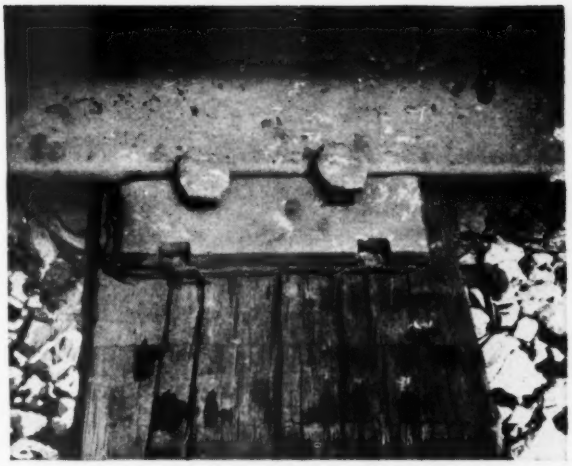
9 YEARS OF TIE PROTECTION by BIRD SELF-SEALING TIE PADS UNDER SMALL TIE PLATES

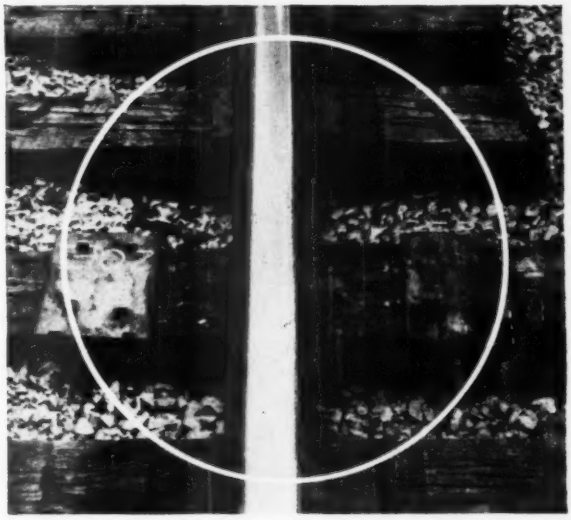


Bird Self-Sealing Tie Pad is securely sealed to the tie after 9 years of service. There has been absolutely no contact between the tie and the plate since the pad was installed.

Smaller tie plates, used with Bird Self-Sealing Tie Pads, carry heavy tonnage — and afford better protection than larger tie plates without pads. Here's a 9-year record of performance on the Louisville and Nashville Railroad:

- For test purposes, tie plates were "bob-tailed" from 7¾" x 13" to 7¾" x 11".
- Bird Self-Sealing Tie Pads were installed in 1949.
- During past 9 years, traffic has averaged 17,500,000 gross tons annually.

Illustrations show the permanent and effective seal with the tie and the resulting protection of underplate and spike-hole wood. For interesting booklet, write to Bird Tie Pads, East Walpole, Massachusetts, Department HTS.



These are the results you can always expect with Bird Self-Sealing Tie Pads. Because of its tenacious seal, the pad had to be peeled from the tie. Note that the underplate and spike-hole wood is as sound today as when Bird Self-Sealing Tie Pads were originally installed. *Moisture and abrasive materials could not penetrate the seal.*

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Working on the track at night

More track work is being done after dark these days, especially surfacing. What's behind this trend? How extensive is it? What have been the results? How is the work being illuminated? These and other questions are discussed in this article which is based on the practices of a number of roads that have done work on the track after dark.

● There's nothing new about doing track work at night. Over a period of years the practice has been followed on a sporadic or local basis by different railroads.

The Pennsylvania, for example, has worked its four Brownhoist ballast-cleaning outfits on a three-trick basis for the past 15 years, the purpose being to accomplish the amount of work programmed with the available equipment. Another large road has followed the practice for several years of laying rail at night where there is an advantage in doing so because of fewer interruptions due to passing trains. Other roads have done various types of track work at night in yards or at main-line locations where the density of traffic was such as to make the cost of daytime work prohibitive.

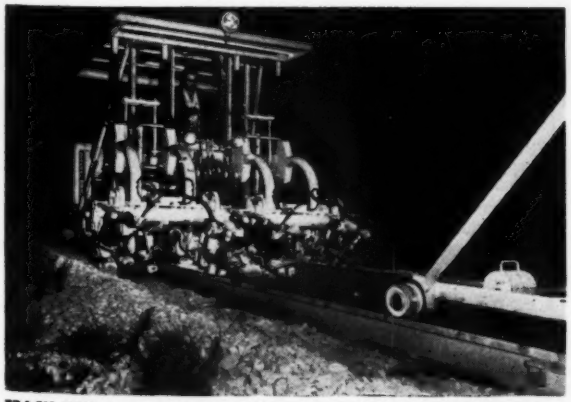
In very recent years, and particularly during 1959, a number of railroads have shown renewed interest in the practice of working track gangs at night. On several lines it may now be considered a regular practice, although the number of such roads is very limited. Even though the great majority of roads have shown little interest in the practice, those few that have adopted it appear to be convinced that it has worth-while advantages for certain operations and under certain conditions.

What is behind the recent increased interest in night work? The answer, basically, is the desire to utilize machines and men to the best advantage. With wages at an all-time high every avenue for promoting efficiency is being explored, and doing work at night is one of them.

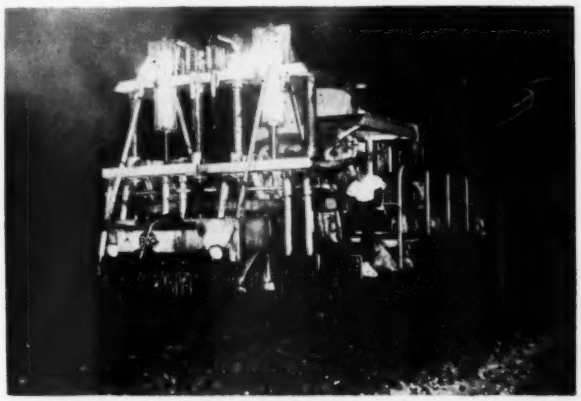
The current flurry of interest in night work has been largely confined to track surfacing. The primary reason why this operation has been singled out for particular attention is doubtless the availability of wire-type "sighting" devices that make it possible to raise and line track, even during the hours of darkness, merely by bringing a pointer to a certain position on a scale.

Surfacing work is being done at night on either a single-trick or a double-trick basis. Where it is done as a single-trick operation the primary purpose is to take advantage of a traffic pattern in which the intervals between trains are longer at night than during the day. It might be said, in fact, that the practice of doing work at night provides a way to use high-speed mechanized equipment at locations where it would be impossible, because of density of traffic, to use other than hand equipment during the day time. (This applies regardless of the type of work, that is, whether it's laying rail, surfacing track, putting in ties, or even spot surfacing.)

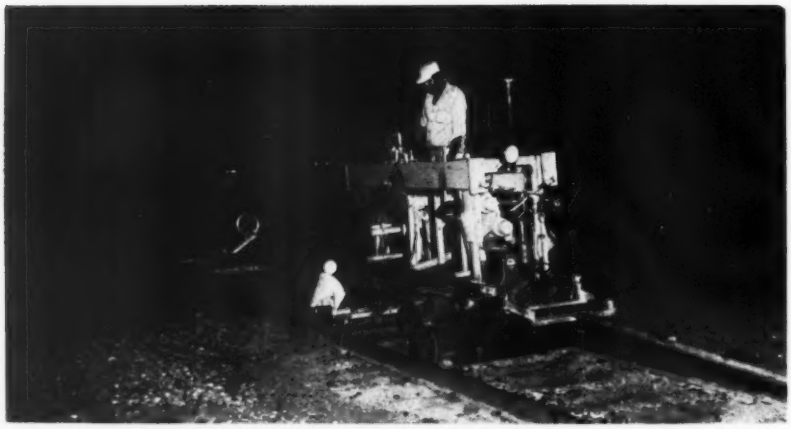
Where surfacing outfits are double-tricked, with one trick extending into the night hours, the primary purpose is to obtain maximum production from

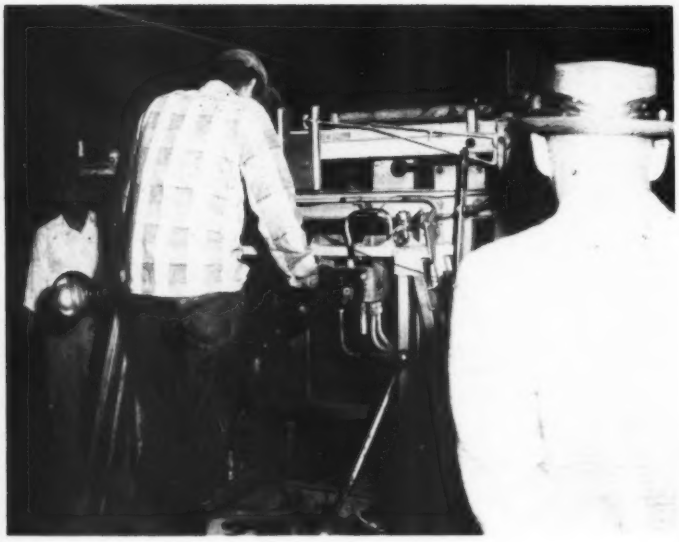


TRACK MEN generally agree that the quality and quantity of . . .



. . . surfacing work done at night are equal to that done in daytime.





LINING TRACK at night (above) with a mechanical liner and a wire-type "sighting" device.

OPERATOR of a Tamping Power Jack raises track at night while a supervisor also watches scale.

the machines available for the work.

Various secondary factors figure in the practice of double-shifting equipment. Where leased equipment is being used, the practice of double shifting means that maximum use will be made of the machines while they are modern. Another factor given consideration on at least one road is that by double shifting the number of slow orders is cut in half in a given territory.

The Chicago & North Western is a road that has had experience with the practice of doing surfacing work at night on a single-shift basis. At the time of writing, a surfacing gang, making a "skin lift" of 1½ in to 2 in, had been working at night for about 11 weeks on this road's double-track passenger line between Chicago and Milwaukee. Equipment in the gang consists of a tamping jack with a Nordberg Trak-Surfacer, a Jackson Track Maintainer, and a Nordberg Trakliner with Line Indicator. A Kershaw Ballast Regulator is used as required to equalize the ballast. In addition to the machine operators and foreman, personnel in the gang consists of two or three laborers shoveling excess ballast into the track from the inter-track space.

The decision was made to work this gang at night because of heavy daytime commuter traffic over the line. Since the practice is for the gang to start work at 9:00 pm it is working in darkness practically all the time. The work is done under traffic although there is some bunching of trains to minimize time lost due to train movements.

Average production of the gang is about 650 ft per hr of on-track time. At the outset the gang was getting about 5 hr of on-track time and was surfacing about 3300 ft of track per night. Later, it got into territory where there was a considerable number of freight-train movements, which cut the working time to about 3½ hr and the production to somewhat more than 2000 ft of track per night.

By working this gang at night the railroad is convinced that it has been able to get a great deal more track surfaced than if the crew had been working during the day. The production per hour of on-track time was found to be just as great during the night as in daytime, and there has been no difference in the quality of the work done, according to the road's engineering officers.

Several railroads are doing surfacing work at night on a double-shift basis. Among these is the Pennsylvania which, during the 1959 working season, has worked a number of production tamping outfits on a two-trick basis. In an experiment with such an outfit it was found that, with proper lighting, as much track could be tamped at night as in daylight, with better track usage. In another case, it was found that production was somewhat less during the hours of darkness but sufficient, it was said, to justify the second trick in order to secure maximum use of equipment. With each outfit this road used wire devices with the tamping jack and the track liner, and a force of 9 to 12 men.

Still another road has been double-tricking its track-surfacing outfits on a rather extensive scale. On this road several different types of production tampers are used, but in all cases the raising is done with Tamping Power Jacks used in conjunction with Trak-Surfacers, and the track is lined with either Nordberg Trakliners or RMC Linemasters, equipped in all cases with Line Indicators. Foreman and roadmasters on this road report there is no perceptible difference between night-time and daytime production per hour of on-track time, or in the quality of the work done.

Some observers, in fact, point out that night work actually has a number of advantages. One is the fact that the equipment operators, with their attention concentrated on a pointer or other illuminated area, are less distracted by the other men. Another is that the men are more apt to remain in their position in the production line. Finally, during hot weather it is pointed out that the men are more comfortable at night and work more efficiently.

The matter of labor relations is a factor that must be considered when planning for night-time operations. On some roads it has not been too much of a problem but on others negotiations have been necessary to clarify some aspects of the rules.

Methods of lighting night surfacing work

Where track-surfacing work is done at night the individual machines are invariably equipped with special lights to illuminate the work. These may or may not be supplemented by separate floodlighting supplied from an independent source.

Practice on the North Western affords an example of the amount and type of lighting provided on the individual machines in the track-surfacing gang. Lights provided on the Track Maintainer in this road's night gang include a headlight front and rear, several tractor-type lights mounted on the front end to illuminate the area around and in front of the tamping tools, and a flashing amber light located on top of the cab roof. The latter serves as a warning signal for trains and vehicular traffic at grade crossings. Also a dome light is placed under the cab roof for the use of the machine operator if it should be needed. To meet the increased power requirements of these lights the Maintainer was provided with a larger generator.

The tamping jack, which is the lead machine, was also provided with a larger generator to power two spot floodlights, one directed forward and the other to the rear, and several tractor-type lights placed to illuminate the working heads.

On the Trakliner there is a headlight in either direction and a tractor-type light mounted on each corner of the frame to illuminate the lining shoes. Another light illuminates the pointer and scale. Power for the operation of these lights is provided by a self-contained Onan 110-volt power plant carried on the lining machine. The purpose in providing a plant of this type is to have a source of power for operating electric tools such as drills and impact wrenches.

Additional illumination beyond that provided on the individual machines is not considered necessary. Since the Ballast Regulator comes equipped with running lights additional lighting is not provided on this machine for night work.

Another road that does surfacing work at night with equipment similar to that used on the North Western also furnishes about the same kind and amount of lighting on the individual machines. In addition some of the gangs are accompanied by a track-mounted floodlight tower built of aluminum tubing and angles. Mounted on four flanged rollers, the tower, normally 14 ft high, is so constructed that it can be extended to a height of 20 ft.

At the top of the tower are mounted six 300-watt floodlights, three facing in each direction along the track. Electric power is provided by a 3500-watt gas-electric generator carried on a platform at the base of the tower. The floodlight tower is normally towed behind the rear buggy of the Trak-Surfacer. It can be handled to and from the track by two men.

MOVABLE on-track floodlight tower used by one road for lighting night work.

Railroads, M/W union settle controversy over job stabilization

An agreement was reached on October 8 between the railroads and the Brotherhood of Maintenance of Way Employees on the job stabilization demands made by the union more than two years ago.

Announcement of the settlement was made in a joint statement by Theodore Short, chairman of the Western Carriers Conference committee, and Harold C. Crotty, president of the Brotherhood.

Terms of the settlement provide that when the carriers propose material changes in work methods which will adversely affect employees, the Brotherhood will be consulted relative to application of existing rules and on such matters as seniority and the displacement of affected employees.

The railroads, however, are not required to reach an agreement with the union before the changes take place.

Under the new agreement, provision is also made for:

- Procedural steps, and, if necessary, arbitration if railroads and the organization cannot agree on rates of pay for new positions which do not already have established rates. Arbitration is to be conducted under the Railway Labor Act by a three-man board. Issues are to be confined to three points: Whether the rate established by the carrier is proper, whether the rate sought by the general chairman is proper, or whether some intermediate rate should be set.
- A 96-hour notice of reduction in maintenance forces.
- Publication of rates of pay in a master M/W schedule and the furnishing of information relative to general increases or decreases in rates of pay.
- Preservation of existing rules which are identical to, or more favorable to employees than, the mediation agreement rules.

Mr. Crotty said that "although this agreement does not contain all the things requested in our notice of May 22, 1957, it does mark a major step forward in our efforts to obtain greater protection and consideration for railroad employees in the changes that are taking place in the maintenance-of-way department . . . I think it's recognition on the part of railroad managements that the welfare of the employees will be given consideration within possible limits in instances where changes in work methods of technology create a situation that affects them adversely."

The brotherhood president said he views the agreement as a recognition that "the welfare of the employees can be given due consideration and the functions of management protected" at the same time. He also praised the setting up of specific procedure, ending in arbitration if required, to settle disputes over rates of pay.

Job stabilization has been a disputed area between the carriers and the M/W union for a number of years. Brotherhood demands were formalized and updated in a 10-point program announced by the union May 22, 1957. The National Mediation Board entered the dispute in January 1958.

The union's 10 points covered rules changes relating to force reduction; seasonal variation in employment; organizational changes in work methods; changes in track section limits; mechanized track gangs; use of M/W machines; travel allowance and expenses for weekend trips home and expenses away from home (for employees assigned to live in camp cars and trailers); rates of pay; contracting out of M/W and structures work; and severance pay.

How to cope with present-day maintenance problems

One road's formula

Key points in the program adopted by the Pennsylvania to counteract the high cost of labor and materials

By **C. J. Henry**, chief engineer, Pennsylvania

Every railroad has been faced with the problem presented when maintenance allotments remain almost constant while labor and material costs keep on going up. Here Mr. Henry tells what the Pennsylvania has done to solve this problem. The article is based on an address presented before a joint session of the recent conventions of the Roadmasters' and B&B Associations.

● The purpose of each American railroad is to make a profit.

The function of any railroad engineering department, as related to this purpose, is to construct and maintain facilities at costs that will make possible the transportation of freight and passengers at a profit. With labor and material prices increasing at a rate in excess of the increase in gross revenues, the amount available for maintenance expenditures remains almost constant and in some cases becomes less.

This economic situation imposes on maintenance engineers the problems of greater production with less personnel, increasing the life of materials, adjusting forces and work methods so that the ratio of maintenance expenditures will be within the limits set by management, and, at the same time, keep the road in proper condition for transportation needs.

I will describe some of the methods we have used to meet the various problems.

First, it was necessary to do something about the time-honored method of performing track work with section and extra gangs. A trial of mechanization was made by equipping a few extra gangs with such modern machines as spike pullers, power jacks, tie removers, tie handlers, scarifiers, tie inserters, rail lifters, tie borers, tie nippers and spikers, ballast distributors, track tampers, tie spacers, track liners and ballast regulators, representing an investment of approximately $200,000 for a gang of 55 men.

The results were satisfactory. For example, in one district in 1952, 72 miles of track were worked with 975,000 man-hours using the old, conventional methods. In 1957 the same territory was worked by mechanized equipment using 420,000 man-hours or a reduction in man-hours of about 56 per cent. The quality of the work was better, for each, and every tie was given the same uniform tamping.

A second type of gang was organized to take care of a general surface or skin lift. This gang was equipped with power jacks, surfacer, power tamper, power liner and ballast distributor, representing an investment of $80,000 and manned with 16 men. Again the results were satisfactory.

From these trials it was decided to adopt the cycle maintenance principle and to expand it to system proportions as fast as money for machines and equipment became available. This means tie renewals are made on a six-year cycle and intermediate surface lifts made every two to three years as traffic conditions may require. With the exception of certain terminals and yards, all maintenance is now performed in this manner between Philadelphia and Chicago and Pittsburgh and St. Louis. For mobility, maintenance gangs are housed in camp cars and are assigned to programmed work on a district basis.

Types of work gangs

Each district or former operating division is equipped with:

A heavy maintenance gang
Two surface lift gangs
Three spot-surfacing gangs
Two work-train gangs
Two road-crossing gangs
Three skirmish gangs

The responsibilities of the former section foremen are taken over by the supervisor of track, aided by the required number of track patrolmen, who have the qualifications of a foreman-track and are compensated at that rate. Patrol districts vary in length from 40 to 50 miles and are equipped with track cars or rail-highway auto trucks.

For emergency situations and miscellaneous work, each supervisor is furnished a truck equipped with a hydraulic tail gate, rail saw, power drill, small air compressor, tamping tools and a 14-ft section of rail drilled at both ends. In the event of a broken rail, a 14-ft section is cut from the rail and replaced with the emergency section, and the track restored to service. The short lengths are then replaced at convenient times by a self-pro-

"In 1952 the average district had a track-maintenance force of 1,000 men. Today's mechanized forces total about 350."

- Mechanization
- Cycle maintenance
- Force reorganization
- Reports on work, costs
- Accurate planning
- Checking progress
- Machine repairs
- Machine utilization
- Methods studies
- Longer service life
- Research, tests
- Watch other roads

pelled crane equipped with a trailer car.

Each supervisor of track is assigned a welder, a machine operator, a chauffeur, an engineer-work equipment and four trackmen to man the miscellaneous work gangs.

Repairs to road crossings are programmed on a district basis, and the work performed by specially organized and equipped highway crossing gangs.

Skirmish gangs correct intermediate surface and line conditions that may develop between work cycles.

Heavy-duty and out-of-face surface gangs are programmed during winter months for work in yards, right-of-way brush cutting, snow fighting, etc.

In 1952 the average district had a track-maintenance force of 1,000 men. Today's mechanized forces total about 350.

The bridge and building department has also been the subject of extensive study, and we now have one region completely mechanized. The equipment provided consists of the following: A rail-highway crane for heavy timber and concrete repairs; a grout machine capable of performing such work as grouting and pressure pointing, shotcreting and sand blasting; a grease machine for spraying bridges, roofs and tie coatings; an aerial tower mounted on a rail-highway unit, which is used in place of scaffolding to make repairs to buildings and bridges; a pressure spraying assembly used for painting the exteriors and interiors of buildings, applying roof mastics and greases on bridges; a power pack consisting of jacks, drills, saw, impact wrench and bolt puller, which is used by the timber repair gangs; one unit of air-operated staging that is used with the grease machine; and a trailer equipped with all small tools necessary for making repairs to buildings. There is also a highway trailer for housing men. This department will be revamped systemwide as fast as equipment can be financed.

Get reports on work, costs

Since reduced unit costs through increased production is our objective, it was necessary to set up a procedure for obtaining data and distributing the information, not only to system and regional officers currently but also to the supervisors and general foreman responsible for the work. For this purpose a group was selected from maintenance officers and sent to school to study industrial engineering methods. This group developed a code method of reporting the hours expended on 165 items of maintenance work. The data are accumulated currently on IBM machines located at system headquarters, and sent out in report form each month to all concerned.

Cumulative reports are run off every quarter showing total amounts of work performed, number of hours spent, number of dollars spent for labor on each item and the number of man-hours per unit. For example, if it is desired to know the total number of feet of track raised by machines during the first six months of 1959, this report will show 5,496,982 ft. It will also show that 254,625 man-hours were expended on this work at a cost of $582,515 and that the number of hours expended per unit was .046. The report gives the same data for each region and the problem of keeping a comparative record becomes relatively simple.

The group also makes detail studies of methods used in performing the various types of work. Movies are taken and shown at various speeds to determine the manual movements made by operators in the use of machines. The purpose is to reduce the number of movements, speed up production and reduce the number of persons engaged in the work. The results have been extremely satisfactory, and have resulted in gang reductions ranging from 10 to 50 per cent and substantial increases in total production.

Cycle maintenance methods call for accurate planning. The initial program is prepared by the supervisor of track, and includes such data as locations by mile post pluses, number of ties required, average lift in inches, number tons of ballast, days required, total cost and unit costs per lineal foot of track. The cost includes an item representing amortization of machines, predicated on a realistic life or upon actual rental figures. This data are accumulated by the district engineers for each sub-district and submitted to the regional engineer, who, in turn, submits it to the system office. Each programmed track job has a price tag.

Bridge and building programs are prepared on a gang basis and include definite job assignments by dates, estimated expense expenditures, capital expenditures and retirement expenditures, detail lists of material requirements by dates and estimated costs.

Cleaning of ballast is of first importance in the proper maintenance of tracks. Ballast is cleaned by company-owned ballast cleaners augmented by rented equipment. The ballast cleaners have been developed by the railroad over a period of thirty years. Four machines representing an investment of about $1,000,000 clean an average of 1,500 miles of intertrack space and 1,500 miles of shoulder each year at an average unit cost of $.05 per ft.

Rail is laid by mechanized gangs of 85 men each. Costs for the past two years have averaged $26.00 per ton. These costs include delivery of rail, laying of rail, picking up the old rail and other track material, and all costs of owning and maintaining the equipment and machines used in the operation.

Program progress is followed by

"... Inspection trips have demonstrated that cycle maintenance methods have resulted in a more uniform ride and more uniform rating between sub-divisions."

Coping with today's M/W problems cont'd

system officers through the medium of track inspections. Track, building and signal supervisors, district engineers, regional engineers and engineers maintenance of way accompany the inspection party over their respective territories four times each year. A machine and a formula are used to grade each sub-division, each trip. Actual unit costs are compared with estimate costs. The method and cost control boys prepare an annual statement showing miles of track worked, average man-hours per mile of track for each sub-division, and its average rating. These inspection trips have demonstrated that cycle maintenance methods have resulted in a more uniform ride and more uniform rating between sub-divisions.

With the exception of cranes and ballast cleaners all repairs to maintenance machines are made at three strategically located repair shops by the work equipment engineers and machine operators who operate the machines during the work seasons.

Results of tests

Our research and test department has been invaluable to us in the development of new ideas and in determining the right materials for the particular job. An example of its work is the development of the 133, 140 and the 155-lb rail sections. A recent review of new rail failures occurring during the ten-year period prior to 1946, and the ten-year period subsequent to 1946, when the new rail sections were placed in service, shows a 99 per cent improvement.

The specifications for ballast, developed only after rigid and exhaustive tests, have resulted not only in improved track-surface conditions, but in reduced total costs for ballast. Testing is a continuing process. The ballast from each quarry is tested at least once each year, graded, and used at locations where the rating is suitable for the traffic volume.

The research and tests on tie anti-splitting devices have resulted in the use of dowels costing 30 cents per tie, which have definitely increased the life of our ties.

Methods developed by our test department for welding rail ends, surface grinding rails, cropping of rails, and reforming joint bars are a few of the tangibles that have really paid off for us in prolonging the life of rails and in lessening maintenance costs.

Many steel bridges designed fifty to sixty years ago with ratings of Coopers E-50 and less are in need of major repairs or replacement. Careful research and study of electric welding by our structural engineers have resulted in the development of methods for not only repairing but for strengthening these structures, and the work can be successfully carried on under traffic.

The success of any mechanization program is dependent on the number of hours the machines can be used. At present most of the equipment is designed for on-track use. In multiple-track territory this problem is not difficult if the program planning provides for temporary crossovers and block stations placed at strategic locations, and the work scheduled on a two-trick basis, or during hours of minimum traffic flow.

Here is a situation that calls for a full and complete understanding between the maintenance, transportation and traffic departments. Each must keep profit in mind as the common objective, and well-maintained track and structures are substantial contributors toward the net of any railroad. Not too long ago M/W ratios of 15 per cent were accepted practice. Now 12 per cent is being questioned. Lower ratios are possible by mechanization provided full utilization of machines is made possible and rail conditions are equal to the needs of traffic volume.

No one organization has a corner on ability or ideas, and it is always desirable to learn what your neighbor is doing. The Form "A" filed with the Interstate Commerce Commission by each railroad each year is an interesting source of information as to what each road is spending by maintenance accounts. Comparative statements are worth the time spent in study and analysis, especially when they include other roads in your district.

"No one organization has a corner on ability or ideas, and it is always desirable to learn what your neighbor is doing."

EXCEPT for the shorter ties all details of th

Crossties

● What is the proper length of a bridge tie on open-deck timber bridges? Some roads use 9 ft and others 10 ft on main-track structures. The Illinois Central was one of those roads using the 10-ft lengths as standard until the beginning of 1959. Now its standard is 8 ft 6 in for all timber trestles using 3-ply stringer chords. For all 4-ply timber chords the road will continue to use 10-ft ties.

The switch to the new standard came about this way: A bridge inspector began to wonder what purpose was being served by those parts of the 10-ft ties that projected beyond the outer edge of the guard timbers. Standard plans called for the outer edge of the 4-in by 8-in guard timbers to be 4 ft 5 in from the center line of track. This resulted in a 7-in projection at each end of each tie, which was apparently not doing any work.

Why not, reasoned the inspector, save the cost of the useless wood by using shorter ties? To go further, why not use standard sawed oak crossties? This would not only cut down the inventory of bridge ties but would also permit a less-expensive tie to be used.

ails of the

construction are the same as the old standard, even to hardware.

TWO TIES in a 14-ft panel are turned on edge and dapped to fit the 3-ply chord (above). With the new tie standard, there is less useless wood extending outside the guard timbers (below).

ties used on bridges

A bridge inspector on the Illinois Central began to wonder why bridge ties are as long as they are. As a consequence this road has now standardized on 8-ft 6-in ties for use on timber trestles using three-ply chords.

The idea was first tried in 1954. In that year it was necessary to renew the deck of a branch-line timber trestle having 3-ply stringer chords. As an experiment he used 6-in by 8-in by 8-ft sawed oak and sawed gum crossties. Two ties per 14-ft span were set on edge and were dapped to fit over the 3-ply chord. These ties acted as lining ties. The other 10 crossties per span were laid on their 8-in sides.

It was found, however, that there was too much variation in the thickness of the crossties. This necessitated considerable adzing to obtain uniform bearing on the stringers. It was therefore concluded that the thickness of the ties should be dressed to an exact dimension. It was also concluded that the 8-ft 6-in length was more suitable. Hence, it was decided to use only the 7-in by 9-in by 8-ft 6-in oak crossties for this purpose. The two ties which are used for lining are dapped before treatment.

The old and new standards — a cost comparison for a 14-ft panel

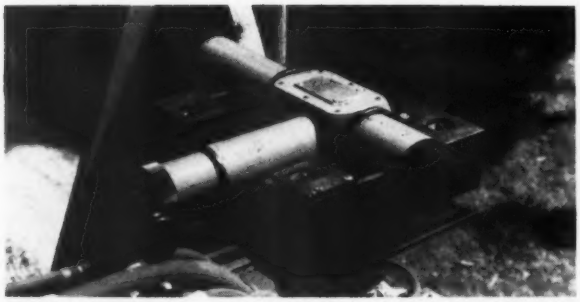
Old standard:	10—6-in by 8-in by 10-ft 0-in pine bridge ties at	$7.08=$70.80
	2—8-in by 8-in by 10-ft 0-in pine lining ties at	9.30= 18.60
	Total	$89.40
New standard:	12—7-in by 9-in by 8-ft 6-in sized oak ties at	4.95= 59.40
	Net saving	$30.00

Saving per lineal foot of floor =$2.14

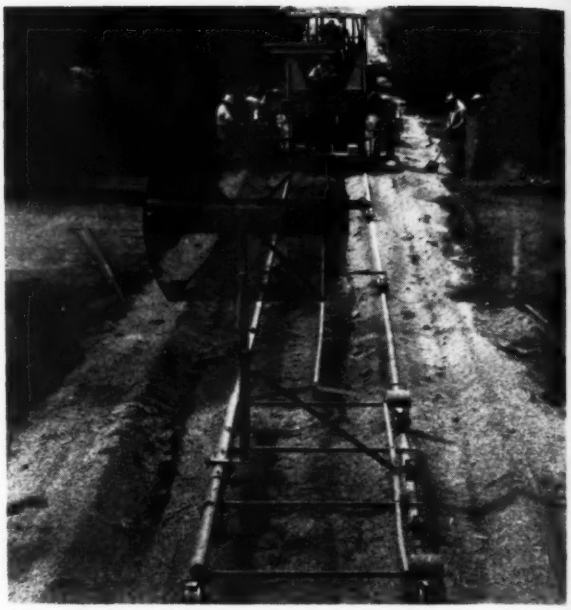
The decks on several other bridges have now been renewed using these sized crossties. Except for the ties, all other deck construction remains the same as the old standard, even to the hardware. The new standard for 3-ply chords was put into effect at the beginning of 1959.

Comparative tie costs for a 14-ft panel are given in the table.

Currently, the railroad is renewing about 4,000 lin ft of bridge deck annually on bridge renewals and about the same amount on deck maintenance. On this basis, E. A. Johnson, IC's engineer of bridges, estimates that about $17,120 a year is being saved on the cost of bridge ties. Also, the road has reduced its bridge-tie stock.



SCOPE is mounted on tamping jack in a special cradle with rubber-disk mounting to dampen vibrations of jack.



Pilot model of a bi-scopic track-leveling system is given a work-out when it is used to make a 10-in raise on a track that was being rehabilitated. Key feature of the system is a scope that sights in both directions simultaneously from the tamping jack.

New aid for track raising

● A new surface-sighting device was recently tried out on a tamping jack to effect a substantial track raise. The occasion was to give the device, called the Hoganscope, a thorough testing under severe conditions.

The track on which it was used needed rehabilitation. It was an industrial spur, 5.1 miles long, of which 1.5 miles had been neglected. Part of the 1.5 miles lay in the street and part was located along a river bank where adjoining property owners had land on both sides of the track and kept it, as well as the railroad right of way, planted with bushes and grass. In fact, these neighboring property owners treated the right of way as if it were their own, with the result that the track ran through a park-like area with even a lawn maintained between the rails.

As a result, part of the track was used for street purposes and part was embedded in the earth and covered with sod. The tie condition was poor on both parts. The rail was too light for the traffic. And the track was requiring excessive maintenance.

Since the spur served a large number of industries, some of which were quite important, the railroad decided to do a thorough job of rehabilitation. This included the digging out of the old ballast and replacing it with new, renewing the rail with a heavier section, renewing all of the poor ties, raising the track high enough to place from 6 to 10 in of new ballast under the ties, and surfacing and lining it.

Because the track had to be kept in service during rehabilitation the work was carried out in short sections. First, the rail was pried up and thrown out. A front-end loader then moved in and dug a trench about 10 ft wide and 1 ft deep.

Since the easement strip in the street ranged from 13 to 17 ft wide there was no space available for piling or storing materials. The wasted material couldn't be piled on the park-like area because of the likelihood of complaints from neighboring property owners. Hence, everything had to be moved in and out either by truck or work train.

When the track had been excavated, the few usable crossties were placed back in line and new ones were added to fill out the required number per rail. Usable tie plates and 112-lb rail were laid and spiked. Ballast cars were brought in by work train and enough ballast was unloaded and spread to make a 6½-in lift. The track was then raised by a tamping jack and tamped by a production tamper. A second spread of ballast was made and the track was raised to the desired elevation. A Ballast Regulator then shaped the shoulders. This procedure was repeated for the next work section. Finally the track was machine lined.

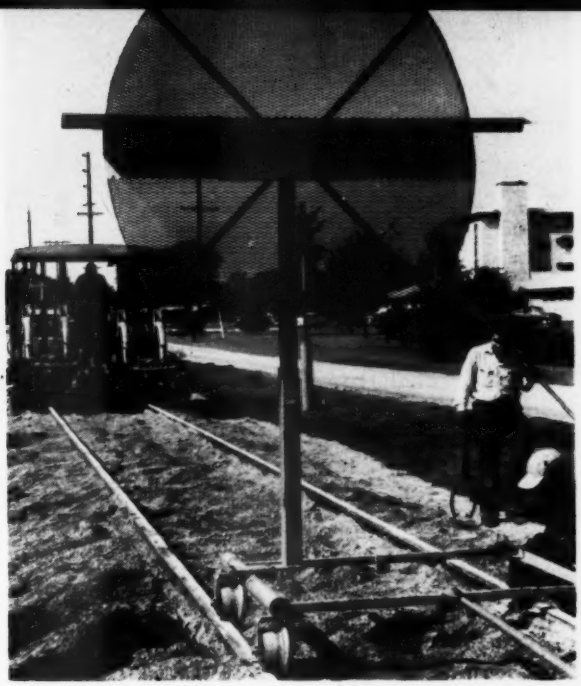
How it was used

The raising and surfacing gang consisted of a foreman, an assistant foreman, 4 machine operators and 8 laborers. One of the machine operators worked the tamping jack and made the track raises with no other assistance than the new leveling system. Track lifts were made at the quarters, centers and joints.

In looking through the eyepiece of the instrument (see accompanying description), the operator saw one, two or three horizontal lines. They were in different colors. A black line, bisecting the image, was the cross hair at the horizontal axis of the instrument. Another line was red and was painted on the front spotboard target, 100 ft away. The third line was a green line on the rear target, 25 ft away.

The operator then turned a knurled bolt provided on the scope's box-type mounting. This tilted the double scope forward or backward, as desired, to make the red and green lines coincident. The apparent distance between the target images and the central cross hair of the scope was indicative of the amount the track level

OPERATOR, observing both targets through eyepiece, manipulates controls of tamping jack to obtain the desired raise.



◀ FRONT TARGET is 100 ft from the scope. Its dolly, 19.5 ft long, is designed to minimize track irregularities.

REAR TARGET, standing on raised track, is 25 ft back of the scope. Suspended weight holds the spotboard horizontal. ▶

had to be changed. The operator then raised the track with the tamping jack, raising the instrument with it, until all three horizontal lines coincided. Another slight adjustment of the knurled bolt sometimes was required to correct for the amount which the instrument may have been tilted when making the track raise. The track was now at the desired elevation. Usually, once the instrument had been corrected for the required raise, no other adjustment of the knurled bolt was necessary.

Working on a curve

When working around a curve, the targets were placed on the side of the low rail. When it became necessary to change the targets from one rail to another, the dollies were reversed in direction and the targets were turned 180 deg. The scope also was moved to the other end of the machine's cross level and the instrument was turned by flopping it over in its cradle. This was done by removing two knurled bolts on the cradle. The eyepiece also was turned 180 deg and the operator was then "back in business."

The tamping jack, it was reported, had no difficulty in staying ahead of the production tamper. When the work had been completed, the machine operator, gang foreman and the roadmaster, under whose jurisdiction the work was done, all pronounced the results as being satisfactory.

Details of the bi-scopic leveling system

The new track-leveling system is designed for use with any current make of tamping jack. It consists of three major components—a scope and two dolly-mounted targets.

The scope, mounted on the tamping jack, is comprised of two sighting lenses mounted in relatively short barrels, one of which points in the forward direction from the jack and the other to the rear. The optical system is designed to produce co-incident target images at the eyepiece, with the targets occupying the full width of the eyepiece field. The resultant image also is bisected horizontally by a cross hair. Hoods are provided on the scope lenses as protection against rain and ambient light.

All three lenses, i.e., those in the double scope and the eyepiece, are held in a horizontal plane in a special cradle. The latter is suspended by four rubber-disk vibration dampeners on a box-type mounting. This enables the operator to look through the eyepiece without the scope jiggling in his view. The box-type mounting is supported on a telescopic standard which is fastened in a vertical position to the cross level of the tamping jack by a clevis attachment.

The two targets are similar in construction and are mounted on vertical masts on small flanged-wheel dollies. The rear target is held at a distance of 25 ft from the scope by a tubular towing rod which connects the dolly with the tamping jack. The front target is held at a distance of 100 ft from the scope by a series of tubular rods and two-wheel dollies.

The rear dolly has four wheels and supports the target over one rail by a large tubular member. The front dolly, which has eight flanged wheels, likewise supports the target over one rail on a tubular member. The latter is long enough so the end wheels span 19 ft 6 in, or one-half rail length.

The targets themselves are short spotboards, painted white with a narrow horizontal line which is red on the front target and green on the rear target. The spotboard is held to the mast by a single bolt so that a weight pendulum, attached to the spotboard, keeps the latter in a horizontal position. To increase visibility of the spotboard, as well as to help the eye focus on the target, a large sheet of black wire mesh is fixed to the rear of each spotboard, giving the apparatus the appearance of a mobile radar screen.

The masts supporting the spotboards are adjustable in height and are equipped with scales to show the exact height of the cross line above the rails. This permits the rear spotboard to be adjusted to the exact height of the scope, regardless of the type of tamping jack with which it is used, and the front spotboard to be set for the desired track raise. The mast of the front spotboard is equipped with a hand crank for enabling the spotboard height to be adjusted for making run-offs.

The device is a development of Donald J. Hogan & Co., Chicago.

On August 25 the first freight train rolled across a new B&O bridge spanning an arm of New York Harbor. When the train had passed the vertical lift span was raised to its **normal** position to remain there until the next train movement. Among other distinguishing features the bridge is reported to have a lift span of record length.

LIFT SPAN of B&O's new Arthur Kill bridge provides 500-ft navigation channel.

Vertical lift bridge stays up . . .

'Vital Statistics'

Total length	1647 ft
Length, lift span	558 ft
Weight	2000 tons
Clear opening	500 ft
Height of towers	215 ft
Min. vertical clearance	31 ft
Max. " "	135 ft
Time to travel 104 ft	2 min

● "World's longest" vertical lift span —that's the title claimed for the 558-ft channel span of the Baltimore & Ohio's new $11 million single-track bridge over Arthur Kill between Staten Island, N. Y., and New Jersey. Previous claimant to this title was the New Haven's 544-ft span over Cape Cod canal at Buzzards Bay, Mass., completed in 1935.

In addition to its record length, the new vertical lift span has several other outstanding features, including:

- A 500-ft clear navigation channel
- A vertical clearance of 135 ft above mean high water in raised position
- Lift span normally in the raised position
- Roller bearings on the counterweight sheaves instead of bronze bushed bearings
- Air buffers to cushion movements of lift span
- Automatic controls to safeguard bridge operation.

The new Arthur Kill bridge carries the Staten Island Rapid Transit, a wholly owned subsidiary of the B&O, over an arm of New York Harbor. It is the only railroad bridge connecting Staten Island with the mainland and replaces a bridge which was constructed in 1888. In fact, the 496-ft swing span of this bridge was claimed to be the longest in existence at the time of construction and was said to be one of the five longest of its type in the United States when it was dismantled.

Construction of the new bridge was ordered by the federal government, through the Army Corps of Engineers, and was carried out under the provisions of the Truman-Hobbs act. Here, in brief, is the situation that brought about the order:

The volume of traffic utilizing the waterway has steadily increased to the point where approximately 2400 vessels per month pass through the Arthur Kill channel. These include oil tankers of the 100,000-ton class which move regularly to and from refineries located along the New Jersey shore. This increased traffic resulted in a navigational bottleneck at the existing swing span which provided two 207-ft openings.

In its order the Army Engineers directed the railroad to construct a new span which would provide a horizontal clearance of 500 ft and a vertical clearance of 135 ft above mean high water. Since water traffic is greater than rail traffic it was decided that the lift span would ordinarily be held in the raised position, being lowered for train movements.

The government paid the cost of all features of the bridge required to provide specified clearances. The railroad's share of the cost was $1,925,000, much of which was expended for the purpose of increasing the load capacity of the new bridge over that provided by the old structure.

By designing the bridge in accordance with Cooper's E-50 loading, the load capacity was raised so that 70-ton B&O coal cars could be moved over it whereas the old bridge was limited to 50-ton cars.

The new bridge was constructed 60 ft to one side of and parallel to the original bridge. It has an overall length

The old bridge (foreground) had a swing span with two 207-ft openings.

TOWERS are 215 ft high. Lift span travels 104 ft.

. . . except when a train passes

of 1647 ft between abutment backwalls and consists, in addition to the 558-ft vertical lift span, of the following increments:

Twelve deck-plate girder spans, varying in length from 50 to 102 ft.

A through-plate girder span 162 ft 8 in long, the longest ever constructed on the B&O

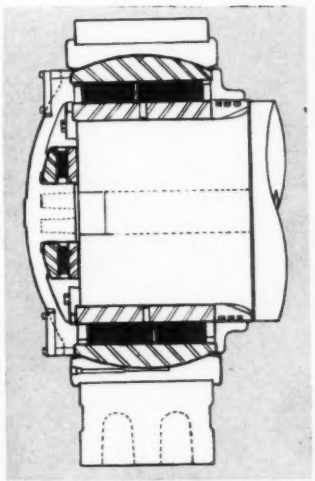
Two tower spans, each 32 ft long between columns

Span lowered, or raised in 2 min

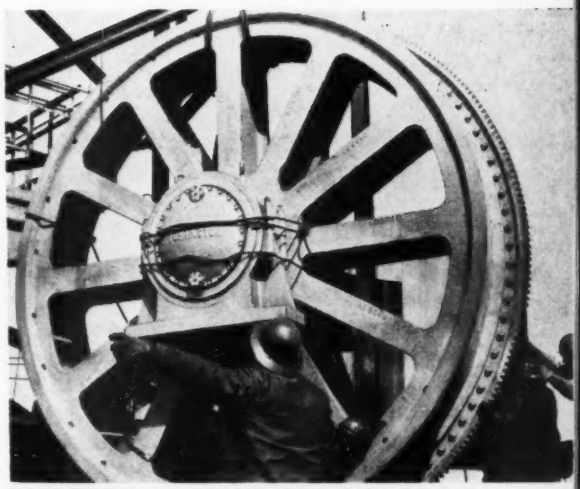
The vertical lift span operates between two 215-ft towers. It travels 105 ft, from a 135-ft clearance in the raised position to a 31-ft clearance in the lowered position, both measured above mean high water. The operating time required to traverse this distance is said to be two minutes.

The span is guided in its travel by cast steel rollers which engage tracks located on the channel side of the tower columns. Transverse guide rollers are mounted at the four corners at each end of the span. Longitudinal guide rollers are installed near the lower chord at one end only, leaving the other end free to allow for expansion.

Weighing about 2000 tons, the span is more than 99 per cent balanced by counterweights. At each tower the span is supported by forty 2¼-in wire ropes. Auxiliary counterweights are utilized to take care of the unbalanced weight of these ropes. At the top of each tower the ropes pass over four 15-ft diameter cast steel sheaves, 10 ropes per sheave. Each sheave weighs 23 tons and is supported on a Torrington roller bearing at each end of the sheave trunnion.



TRUNNIONS of sheaves operate on anti-friction roller bearings.



MAIN SHEAVE, one of eight, being hoisted into position on top of one of the towers.

A total of 16 Torrington bearings, each comprised of a straight roller and roller-thrust unit in combination, is installed. The bearings have a self-aligning feature built onto the outer ring of the radial bearing assembly. The outside diameter of this unit is 45 in.

Use of anti-friction bearings is stated to reduce the maximum operating force by 60 per cent, compared with the force required if bronze bushed bearings had been used. Substantial reductions were thus permitted in both the size and the cost of the power equipment installed. Based on the 25 years' experience in the use of

(Continued on page 36)

ORGANIZED MECHANIZATION

with NORDBERG MECHANICAL MUSCLES®

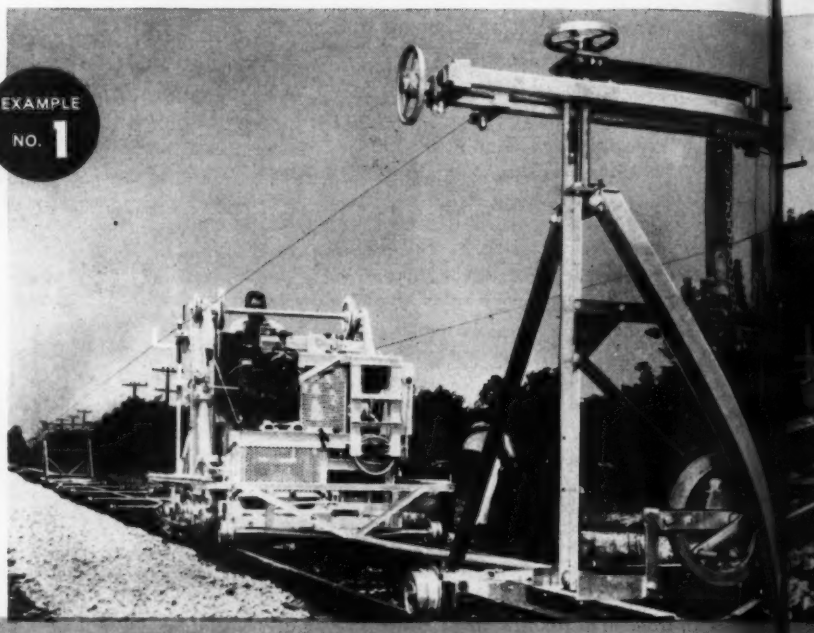
will give you MAXIMUM MAINTENANCE ECONOMY

EXAMPLE NO. 1

OUT-OF-FACE SURFACING AND SMOOTHIN'

In out-of-face surfacing, the Tamping Power Jack and Trak-Surfacer team raises track, tamps ties to hold the raise, and provides the necessary propulsion power. Here, the Trak-Surfacer uses a stretched wire 125 feet long to form a reference line for the top of the grade rail. Following right after, the Gang Tamper tamps all ties. Then the Trakliner® and Line Indicator line tangent and curve track.

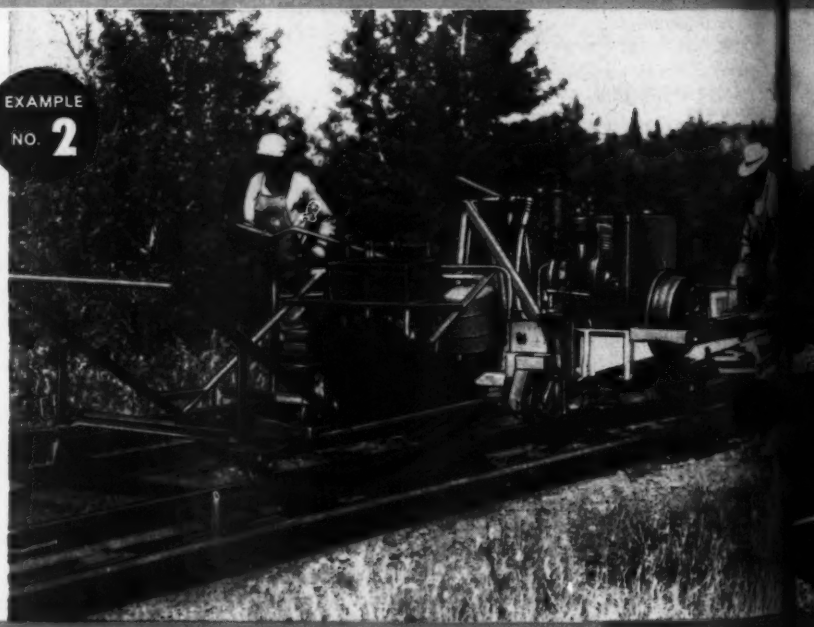
In Smoothin' operations, the same basic Nordberg machines are used, except that the Trak-Surfacer uses a shortened wire 50 feet long.



EXAMPLE NO. 2

RELAYING OPERATIONS

The Dun-Rite® Gaging Machine and Bronco is the key machine, used with these other Nordberg units: Power Wrench, Self-Propelled Spike Puller, Ballast Router, Self-Propelled Adzing Machine, Rail Drill, Tie Drill and Spike Hammer, for completely mechanized relaying operations. Following close behind the adzing machines, the Dun-Rite anchors tie plates to the ties in exact position, so the head-to-head gage is correct. Speed and extremely accurate and uniform gaging are made possible with the Dun-Rite because tie plates are gaged before the rail is placed.



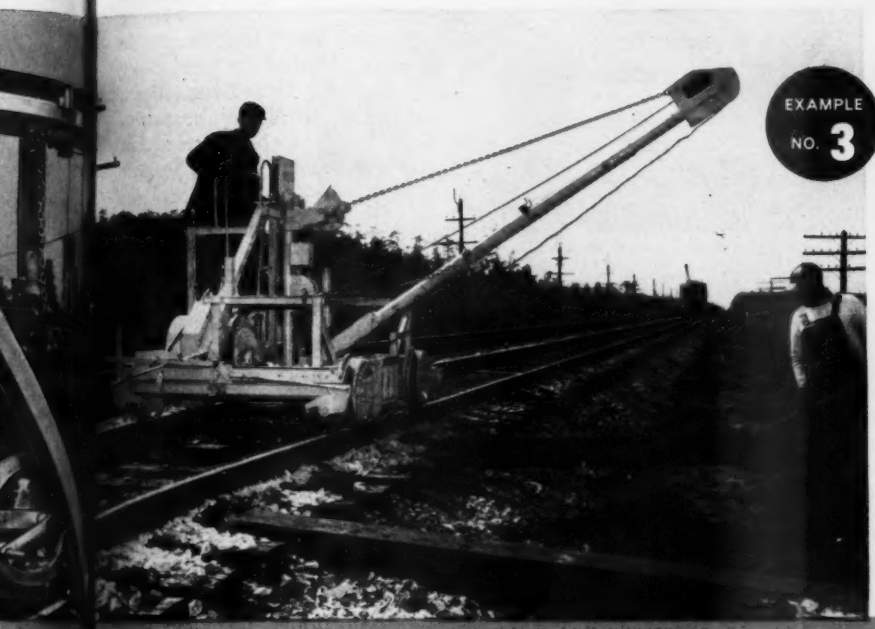
Write For LEASING Plans

For more complete information covering the use of these money-saving Nordberg Mechanical Muscles in ORGANIZED MECHANIZATION, call or write today.

■ ORGANIZED MECHANIZATION has two vital parts. First, providing the best combination of equipment to do a given job, and second, coordinating that equipment into an efficient working team.

The advantages of Organized Mechanization, utilizing Nordberg Mechanical Muscles include (1) Single source of responsibility for all machines; (2) Each machine is designed and built to work most efficiently with other Nordberg machines; (3) Maximum parts interchangeability between machines; and (4) Training of operators is easier and abilities are readily transferred to operate all machines built and backed by Nordberg.

Illustrated below are four examples of the way in which Nordberg Mechanical Muscles are used to make up Organized Mechanization teams to do specific maintenance jobs . . . to assure better, faster track maintenance work at the lowest cost.



EXAMPLE NO. 3

TIE RENEWAL

In this operation, the Nordberg Gandy® is one of the important machines used for reducing tie renewal costs. This efficient unit is used to pull out old ties, insert new ties, pile or load old ties, set machines on or off the track, distribute new ties, including hauling them to the work location. The Gandy is also a great money saver in bridge timber renewal. Other Nordberg machines used in this operation are the Hydraulic Spike Puller and Carriage, Tie Drill and Spike Hammer.

EXAMPLE NO. 4

BALLAST CLEANING OR WASTING

Three basic Nordberg machines are used to handle your ballast cleaning or wasting problems. (1) The Cribex®—to remove material from the cribs; (2) The Ballastex® —to excavate ballast between tracks or on shoulders and waste it or feed it to (3) The Screenex®—which takes fouled ballast from the Ballastex, screens it, and returns cleaned ballast to the track or shoulder in any desired proportions.

(View shows the Screenex in operation, close-coupled to, and being towed by, the Nordberg Ballastex.)

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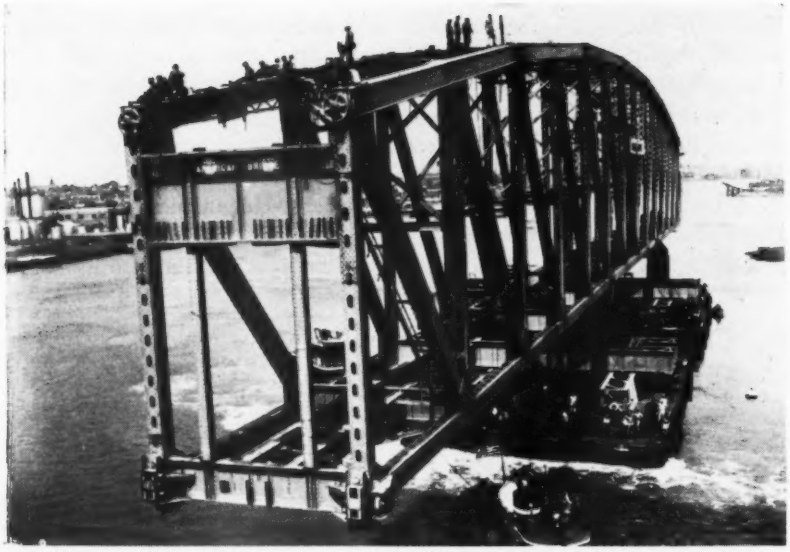


LIFT SPAN, weighing 2000 tons, was preassembled and floated into place on barges.

Vertical lift bridge stays up cont'd

similarly designed Torrington bearings in the New Haven's Cape Cod Canal bridge, it is indicated that maintenance and servicing costs for the anti-friction bearings will continue to reflect further yearly savings in man-hours required for lubrication, as well as in power costs.

How bridge is raised

The 104-ft vertical travel of the lift span is controlled by a "tower drive" system with operating machinery installed at the top of each tower. Controls are electrically integrated to raise both ends of the span simultaneously and maintain a level position.

Electrically driven gear trains engage the circular rack gears on the rims of the sheaves. An adjustable-voltage direct-current drive keeps the two drive motors synchronized. The drive at each end comprises an alternating-current motor-generator set, direct-current drive motor and control motor generator set.

These units are arranged so that the drive-motor speed is governed by the output voltage of the control generator which is, in turn, automatically controlled by an electrical skew-control system. The resulting control is said to be sensitive enough to keep the two ends of the 558-ft span level within approximately one inch. The voltage may also be varied by manual control during acceleration and deceleration of span.

An additional skew-detecting system provides an added safeguard in case of electrical failure of the automatic level controls. This system will automatically break the circuit to the drive motors in the event the span should tilt sufficiently to present the danger of binding against the towers.

The entire electrical drive system is installed in duplicate as a safeguard against electrical failure. The operator may switch from one to the other at any time during operation of the span.

Power for normal operation is supplied by a 4160/2400-v, 3-phase, 60-cycle feeder from the west side of the bridge. Power for emergency use can be obtained from an auxiliary 340-kw diesel-driven generator set installed in the base of the east tower. Aerial cables were used to connect the circuits in the two towers rather than submarine cables, because of the anticipated difficulty of protecting cables adequately on the rocky bottom of the channel.

Air buffers cushion lift span

Full sets of automatic safety controls, guides and locks are installed. Raising the span to its full height automatically trips a locking mechanism that holds the span in the fully open position. It may not be lowered until the locks are released. Another device locks all four corners of the span in the down position. Rail alinement is assured by a transverse centering shoe which is engaged as the span approaches the fully down position, and by special sliding rail joints. In addition, air buffers were installed at both top and bottom corners of the lift span to provide a cushion against any undue shock and to insure a smooth stop when the span is lowered or raised.

The various interlocking circuits are so arranged that the span may not be operated unless the railroad signal system is set against approaching trains. To protect navigation, warning and indicating lights and an audible signal were installed in conformity with U. S. Coast Guard regulations. The lights are controlled by gear-driven limit switches which are actuated as the span approaches the fully open or closed position.

Due to the proximity of the bridge to Newark airport, about 2½ miles distant, rotating aerial beacons were installed on both towers and also at center of the lift span. Installation of these warnings conformed to regulations issued by the Civil Aeronautics Authority.

To facilitate inspection and maintenance of the machinery and electrical equipment at the top of the towers, an elevator is provided at each tower.

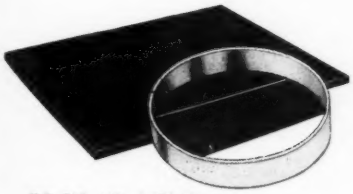
Engineers for the project

Plans, designs and specifications for the vertical lift bridge, including towers, main piers and fenders and the lift-span control systems, were prepared by the consulting engineering firm of Parsons, Brinckerhoff, Hall & Macdonald, New York, which also supervised construction. Both the substructure and superstructure of the approach spans were designed by the B&O's bridge and building department under the supervision of C. E. Sloan, engineer of bridges and buildings, now retired, and his successor Abram Clark. The specially designed, self-alining, anti-friction bearings were supplied by the Torrington Company, South Bend, Ind.

The substructure was constructed by Chas. F. Vachris, Inc. The American Bridge Division of United States Steel Corporation erected the superstructure and demolished the swing span of the old bridge.

Work on the project commenced under the general direction of K. J. Wagoner, the B&O's chief engineer until May 31, 1958 when he retired. It was completed under his successor, C. R. Riley.

SEND NOW . . . for this new brochure giving latest data on FABCO Super-Seal TIE PADS . . . the Pads with the permanent Super Seal.



U.S. PAT. NO. 2,770,421

FABCO Super-Seal TIE PAD — showing the double-thick asphalt Super-Seal, plus the newly developed master binder which makes the asphalt Super-Seal an integral part of the pad.

"Should be on the desk of every railroad man responsible for economical M/W operations!"

FABCO TIE PADS have passed all practical tests of time and tough service on bridges, curves, switches, station and station approach track, as well as in open track and in other areas where the mechanical wear of ties by the tie plates is excessive or severe.

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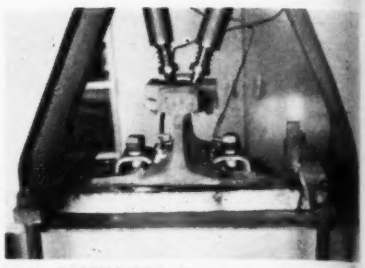
What about the concrete crosstie?

There's been a revival of interest in concrete as a substitute for wood in the manufacture of railroad crossties. Several underlying factors have contributed to this increased interest, including experience with concrete ties in Europe, the special advantages of prestressed concrete for this purpose, and the stabilizing effect of the heavier ties when used with continuous welded rail.



RAIL FASTENINGS for use with "Tie I" being tested in AAR research laboratory.

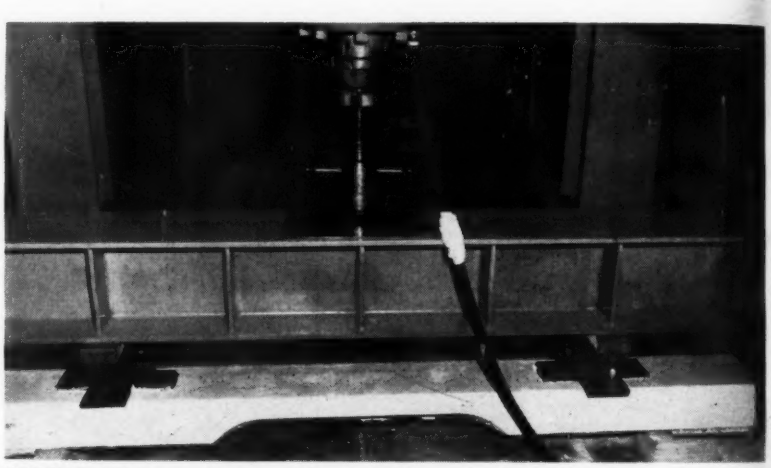
● The concrete crosstie has long been talked about as a substitute for the wood tie. From time to time over the years there have been flurries of interest in the concrete tie in this country, leading occasionally to a test installation. Invariably in the past these installations have soon been followed by a loss of interest.

Now the concrete tie is back in the picture under circumstances that lead many to believe it is in a position to compete on a more favorable basis with the wood tie. This renewed interest is evident in several quarters. The most tangible evidence of it is contained in plans of the Seaboard Air Line and Atlantic Coast Line to install quarter-mile sections of concrete ties in main-line track late this year. Other roads, including the Denver & Rio Grand Western and the Western Pacific, have indicated an active interest in making test installations.

What is behind this revival of interest in concrete ties? A combination of developments or considerations provide the answer. They are:

(*1*) *Extensive use of concrete ties in Europe, especially Germany.*

This development has been sparked primarily by a shortage of timber. Dr. Gerhard Schramm, track advisor for the German Federal Railroads, in comparing the relative costs of wood and concrete ties in Western Germany, has stated that "the concrete tie is superior in economic respects in the long run, if it has a longevity of more than 35 or 46 years," depending on the cost of wood ties. And, he adds, it "appears certain that the concrete ties will have a longer life." There are, according to Dr. Schramm, about 12 million concrete ties in the tracks of the German Federal Railroads. The wood tie is relatively less expensive in the United States than in Germany, but the experience with concrete ties in the latter country, and elsewhere in Europe, has, if nothing else, demonstrated their practicability in service, according to observers in this country.



CONCRETE TIE in the Amsler testing machine at the laboratory. Researchers say it withstood two million cycles of a bending moment amounting to 150,000 in-lb.

(*2*) *Special properties of prestressed concrete.*

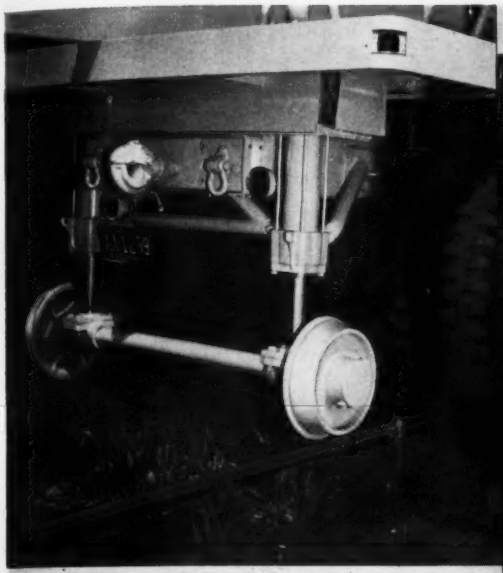
Ordinary reinforced concrete has a very limited ability to withstand tensile stress without cracking. Since the underside of a tie directly under the rail is subject to considerable tension, crossties of conventional reinforced concrete are apt to develop cracks in this area. On the other hand, when ties are made of prestressed concrete the pretensioned cables embedded in them have the effect of keeping the concrete in compression, or at least of preventing the tensile stress from exceeding a predetermined amount. If this level is exceeded due to excessive load, and cracks do develop, they close up as soon as the load has been removed. For this reason, explains G. M. Magee, director of engineering research of the AAR, prestressed concrete ties can be expected to have a much longer service life than those made of ordinary reinforced concrete.

(*3*) *Advantages of use with continuous welded rail.*

Where the rail in track is welded into continuous lengths it is a recog-

(Continued on page 56)

Meet the "RAIL ROVER"



THE VERSATILE TRUCO TURRET DERRICK IS NOW ON RAILS

with the
TRUCO RAILROAD
CONVERSION KIT

Meet the "Rail Rover" . . . a multi-purpose tool for *all* railroad utility work. The Truco Turret Derrick with its Railroad Conversion Unit now operates *on rails* to speed maintenance on track structures, lifting, installing, repairing brush cutting and painting. It is actually a powerful 7½-ton turret derrick, an aerial lift with operating heights to 100' and a rugged hydraulic digger with 30" full-flight auger . . . all in *one* compact, truck-mounted tool.

The Railroad Conversion Unit adapts *any* truck chassis of 16,000 GVW and over for operation on standard guage railroad tracks. Unit may be purchased separately to adapt existing vehicles for on-the-rail use. Front end is lowered hydraulically and lifts truck's front axle completely off the rails. Rear unit engages rails and relieves 30% of weight from rear driving axle. Truck's inner dual wheels provide traction to rails to move vehicle safely and speedily down the tracks.

COMPARE THESE TRUCO FEATURES

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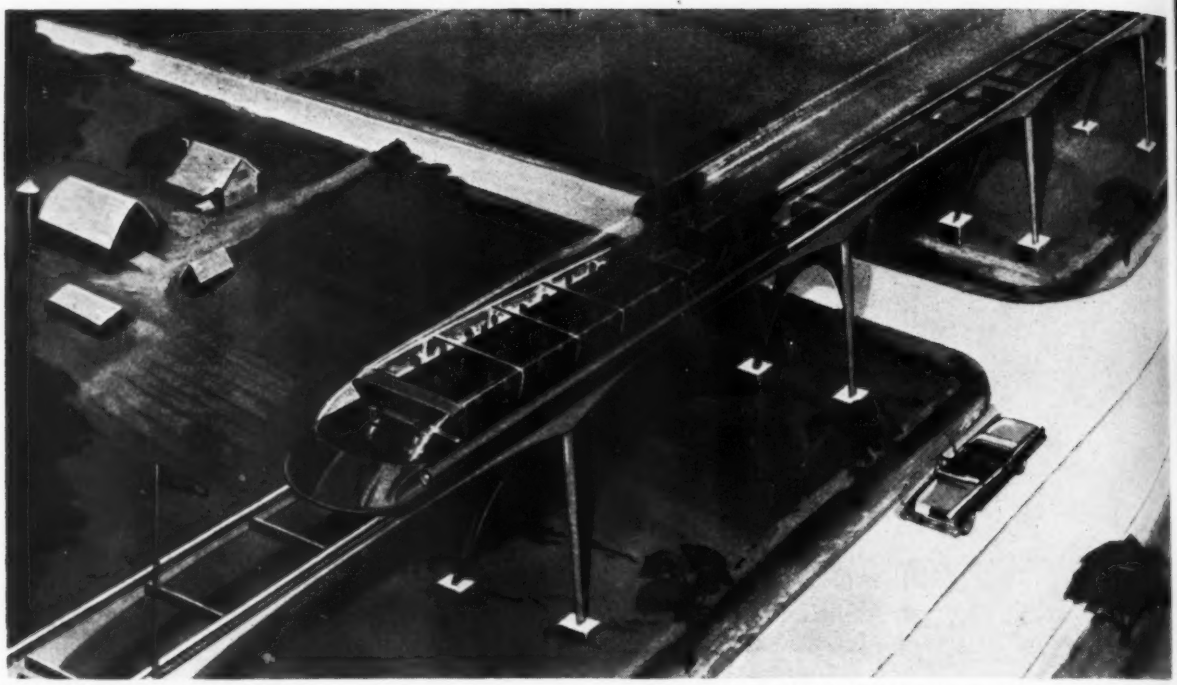
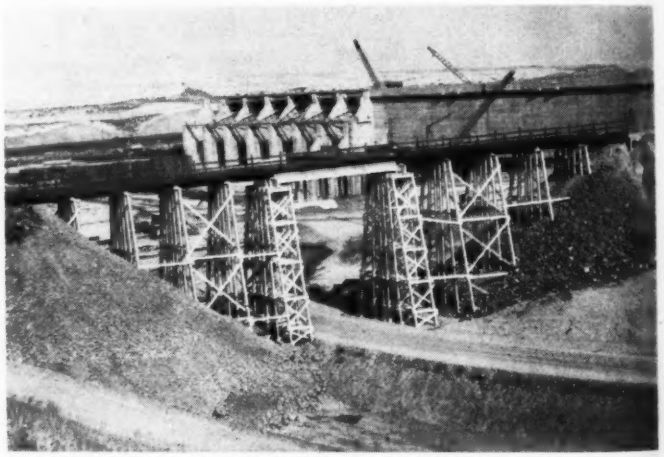


New concept of rail travel

A wheelless, air-supported, rail-guided vehicle that is propelled by air at speeds up to 500 mph is under development by the Ford Motor Company. Designated the Levacar, it would be designed to travel from three to five-thousandths of an inch above a smooth running surface, such as rails. The vehicle would be guided along the track by means of "levapads" which surround the head of each rail. Tiny jets of air pushed through these devices would both support the car and "lubricate" its forward motion. It would be propelled by air ejected from the rear. Ford's engineers visualize the Levacar as operating as single units under completely automatic control. They claim that the vehicle would be able to operate up grades as steep as 50 per cent with only slight diminution in speed and negotiate curves as sharp as 3 deg 50 min, if properly banked, at high speed. It is believed that the Levacar would be competitive with airplanes for distances up to at least 1000 miles, where station stops are about 100 miles apart.

News briefs in pictures . . .



Pipe piles support high trestle

A railroad trestle 177 ft long and 47 ft high has been constructed utilizing steel pipe piling having an outside diameter of 12¾ in and a wall thickness of ¼ in. It was built to move heavy equipment from the Union Pacific to the powerhouse of the Ice Harbor Dam. Piles were supplied by the L. B. Foster Company and were driven a minimum of 30 ft to a 40-ton bearing.

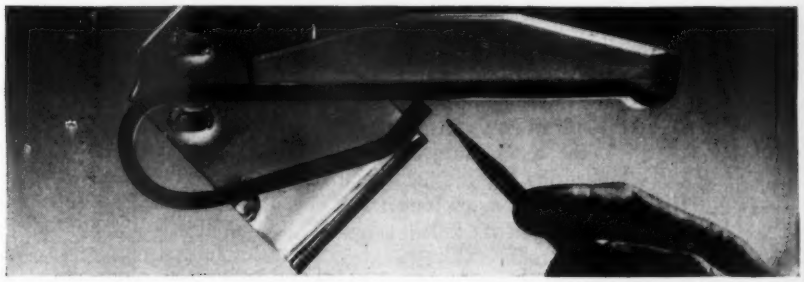
◀ Wrought iron deck plates

Sixty tons of welded 4-D wrought iron plates were recently installed in the floor of a new ballasted-deck bridge carrying tracks of the C&O over a highway near Muskegon, Mich. Welding the plates, manufactured by the A. M. Byers Company, helped form a watertight deck of shallow depth. Long life was a consideration in selecting the type of floor for the bridge.

Here's The Smart Way To Buy Rail Anchors

Buy more holding power. The True Temper BULLDOG Rail Anchor is built with two factory-assembled elements that multiply holding power through a unique two-way *sustained* grip.

Buy tie protection. *Deep* tie-bearing surface transmits load over a wide, flat area to avoid tie damage. It doesn't bear on tie plate, so can't damage tie through spike disturbance.



Buy easy driving. Whether applied manually or mechanically, the BULLDOG installs faster. Time and effort are usually cut in half because improved design means a straighter, more direct path for striking force.

Buy reapplication. BULLDOG anchors can be reapplied again and again, or applied to worn rail . . . with no loss of holding power. That's because the original application doesn't weaken them.

Buy research. True Temper's Mobile Research Lab runs continuing tests on stresses and strains in rail to find ways to make BULLDOG anchors even better.

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OTHER TRUE TEMPER RAILWAY PRODUCTS: BULLDOG Ballast Forks; BULLDOG Shovels; BULLDOG Safety Rail Forks; Hammers, Sledges; BULLDOG Scythes, Weed Cutters.

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BULLDOG RAIL ANCHORS

YOU CAN LOOK TO TT FOR LEADERSHIP

Using recovered crossties

With cycle maintenance, aren't there a large number of crossties being removed before they have served their full service life? If so, what economical use can be made of the recovered ties?

Remove failed ties only

By R. H. PEAK
Division Engineer
Illinois Central
New Orleans, La.

With a four or five-year cycle, which is usual for high-speed-maintenance tracks, there is no need to remove ties with appreciable service life remaining. Ties are marked for renewal which have no more than two years service remaining, which carries them to approximately the mid-point of the cycle.

There is no justification for taking out a tie in the first place if it has useful life left in it. A tie which will not last in the main track until the next cycle, bearing in mind the difficulty of telling just how much longer a tie will last if it has not yet failed, is not fit to use in any track.

The ever-increasing cost of labor makes removal of a tie having more than two years of life uneconomical. The same holds true of the insertion in either new or old tracks of ties which have two years life remaining. Furthermore, a tie will last longer in its original bed than it will if rooted out and placed in a new bed having a different bearing. The removal and redriving of spikes also further shortens the tie life and much of the tie machinery used today damages the tie when it is being removed.

If ties are consistently being removed with considerable service left in them, an examination of tie-marking practices or shortening of the cycles is in order.

Renew only necessary ties

By M. L. WHITE
Division Roadmaster
St. Louis-San Francisco
Fort Smith, Ark.

During the first year or so of cycle maintenance, the idea was to remove ties that still had some service in them. Some thought that we should take out all ties that would not last until the next cycle.

During the past four years, we have been taking out only those ties that are thought to be bad as we worked the location in the cycle. I think this is better.

Within the last six years, I have almost completed a cycle on a 167-mile division. The tie condition on this division is better today, I am sure, than it was six years ago.

If you take out only the ties you think are bad, you can take out good ties only to the extent that you misjudge the ties. This can happen the same way if you were spotting in the ties.

Some one will ask: "How can you 'get-by' between cycles if you just take out the ties that are bad now?" I can reply: "We have been 'getting-by.'"

Track that we worked six years ago is not in bad condition for ties now.

I do not think we should remove ties that have service left in them. Ties will last longer left where they are than when they are removed and replaced in another place.

Ties that would last two, three, or four years in place, would not, if removed, be reused anywhere because the cost of reinserting them would make it prohibitive. Also, released ties, unless they are in very good condition, do not make a good track.

I do not believe we waste timber with cycle maintenance. I also believe

NEW QUESTIONS to be answered in February

Do you have an answer to any of the questions listed below? If so, send it in. Payment—based upon substance and length—will be made for each published answer. If you'd prefer that your name be withheld, we'll gladly comply.

DEADLINE: December 31

• 1. Are there any advantages in the use of oversized crossties? Undersized? Any disadvantages? Does the volume of traffic, kind of ballast or today's track machines make any difference? Explain.

• 2. Frequently, after a building foreman starts work on a job, he finds more work which should be done than is on his work sheet. To what extent is he authorized to procure additional material locally for completing all necessary work? How is this arranged and what steps must be followed for authorization of the additional work?

• 3. To what extent should standby track and turnout material be provided at hump-retarder yards for emergency repairs? Explain. Where should this material be stored?

• 4. Even though a first-class pile may comply with AREA specifications for straightness, it sometimes has a long bend. How should such a pile be started and driven? How much can such a pile be sprung, while being driven, without damage? Explain.

• 5. When raising track, how long should the run-offs be constructed to allow the passage of trains? What speed restrictions should be set in such instances?

Send answers to:

What's the Answer Editor
Railway Track & Structures
79 West Monroe Street
Chicago 3, Illinois

Do you have a question you'd like to have answered in these columns? If so, please send it in.

Spikes set up straight and true by the Racor Dual Spike Setter are firmly, quickly driven by this Racor Dual Driver.

This Racor Spiking Team can do the work of a dozen men

RACOR DUAL SPIKE SETTER AND RACOR DUAL DRIVER CUT COSTS, SPEED RAIL LAYING, AND IMPROVE TRACK

Once, as many as twenty-one men were required to set and drive spikes. Now nine can do the job better and faster than ever before with the new Racor Dual Spike Setter and Racor Dual Driver doing the work of twelve men. Just one or two men are required to position spikes ahead of the Racor Dual Spike Setter which moves in, vertically aligning each pair of spikes and setting them straight with a single, always accurate blow from an air hammer. The Racor Dual Driver completes the job, driving two spikes at once quickly and uniformly. It can also be used to drive Racor studs for better line and gage holding, and wear reduction. As a result this equipment pays for itself in just a few months through faster spiking, smaller spiking crews, easier operation, uniform spiking, and reduced maintenance and down time.

See your American Brake Shoe representative today for complete details on how the Racor Dual Spike Setter and Racor Dual Driver can bring major savings to *your* road.

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we are getting a more uniform tie condition than we have ever had in my 33 years of experience with the Frisco.

Is false economy

By N. H. Maas
Roadmaster
Chicago & North Western
Proviso, Ill.

In cycle maintenance the length of the cycle governs the decision as to tie removal. A tie which will not last at least two-thirds of the cycle and does not have good ties on each side should be removed. This is a matter that should be policed very carefully by supervisory personnel so that only the minimum number of ties which have several years of life are removed. To permit a considerable number of ties to remain in track is false economy, as this practice would shorten the cycle and increase the cost of maintenance considerably.

The re-use of ties removed in cycle maintenance is not economically sound in view of the high cost of labor. The cost of sorting, loading, shipping, distributing and reinstallation in tracks such as sidings, etc., would be prohibitive.

The disposition of old ties has been a problem in recent years, especially so in the terminal areas due to public acceptance of gas and oil heating. Furnishing various city and civic groups old ties for parking lots, retaining walls, etc., disposes of some of the old ties without cost and assists in maintaining good will. Banding of the old ties for handling by a crane to a point where burning is permissible is the most economical means of disposing of old ties.

Re-use in side tracks

By F. D. Allen
Roadmaster
Canadian National
Capreol, Ont.

Since 1957 a project has been underway for ballasting the Ruel subdivision with slag from the mines at Sudbury, Ont., replacing gravel ballast. During this operation all ties from the main track are being removed which do not have a life expectancy of at least four years.

Consequently quite a number of ties are released which are still serviceable. These are used in yard tracks, passing trucks, back tracks, temporary spurs, and extensions of existing spurs, or can be used for temporary tracks, such as around a derailment. In all cases they should be turned over.

My method of handling is to first spot all the ties for removal on one end of the tie with any low grade paint. When the track is being skeletonized ahead of the slag unloading, all ties spotted are removed and replaced with new ties. Then I send a man trained for the purpose to check all the removed ties. Any that are fit for use as previously mentioned are spotted again in the center with two spots.

The scrap ties are piled for burning and the ties for salvage are piled in bunches of from 10 to 20 on top of two scrap ties so that a sling can be easily placed around them for loading in gondola or general purpose cars to be shipped to the required points.

Bridge cap moving under traffic

What is wrong when a cap on a timber-pile bent works up and down under traffic? Explain. What remedial measures may be taken to correct this situation?

Several causes

By C. E. Phelps
Bridge & Building Supervisor
Atlanta & West Point
Decatur, Ga.

Several conditions can cause a cap on a timber-pile bent to work up and down under traffic.

On our branch lines we still have some trestles with three-ply, 7-in by 14-in stringers on bents 12 ft 6 in apart. These bents vibrate and work more than caps on our trestles with 7-in by 16-in stringers on bents 12 ft apart. Of course this is due to longer spans and lighter timber.

In some cases where piling is not cut off uniformly, and also where braces are loose, the bents will vibrate, causing the caps to work.

Stringers that are crooked or warped, and do not have full bearing on all three bents, will cause a cap to work. Also, a variation in the size of the stringers and caps will result in movement.

For the past few years we have been using treated oak timber for caps. This is a very hard timber. In making repairs, I notice that, where one oak cap has been placed between two pine caps, the pine caps will work slightly because of the firmness of the oak cap. The pine caps are soft and have a tendency to work up and down.

I find that you will not have much trouble with caps working up and down under traffic if the following procedure is carried out:

Keep the approaches in good condition.

Cut off the piling uniformly and see that each pile has full bearing before metal is placed between cap and pile.

Size the stringers and caps uniformly. For example, 12-in by 14-in caps should be sized to 11¾ in by 13¾ in and 7-in by 16-in stringers should be sized to 7 in by 15¾ in.

All oak or all pine caps should be used. They should not be mixed.

Also, the caps should be well drifted to the piles, the bents properly braced and bolted, and two ⅜-in by ⅜-in by 8-in boat spikes used to each bolt.

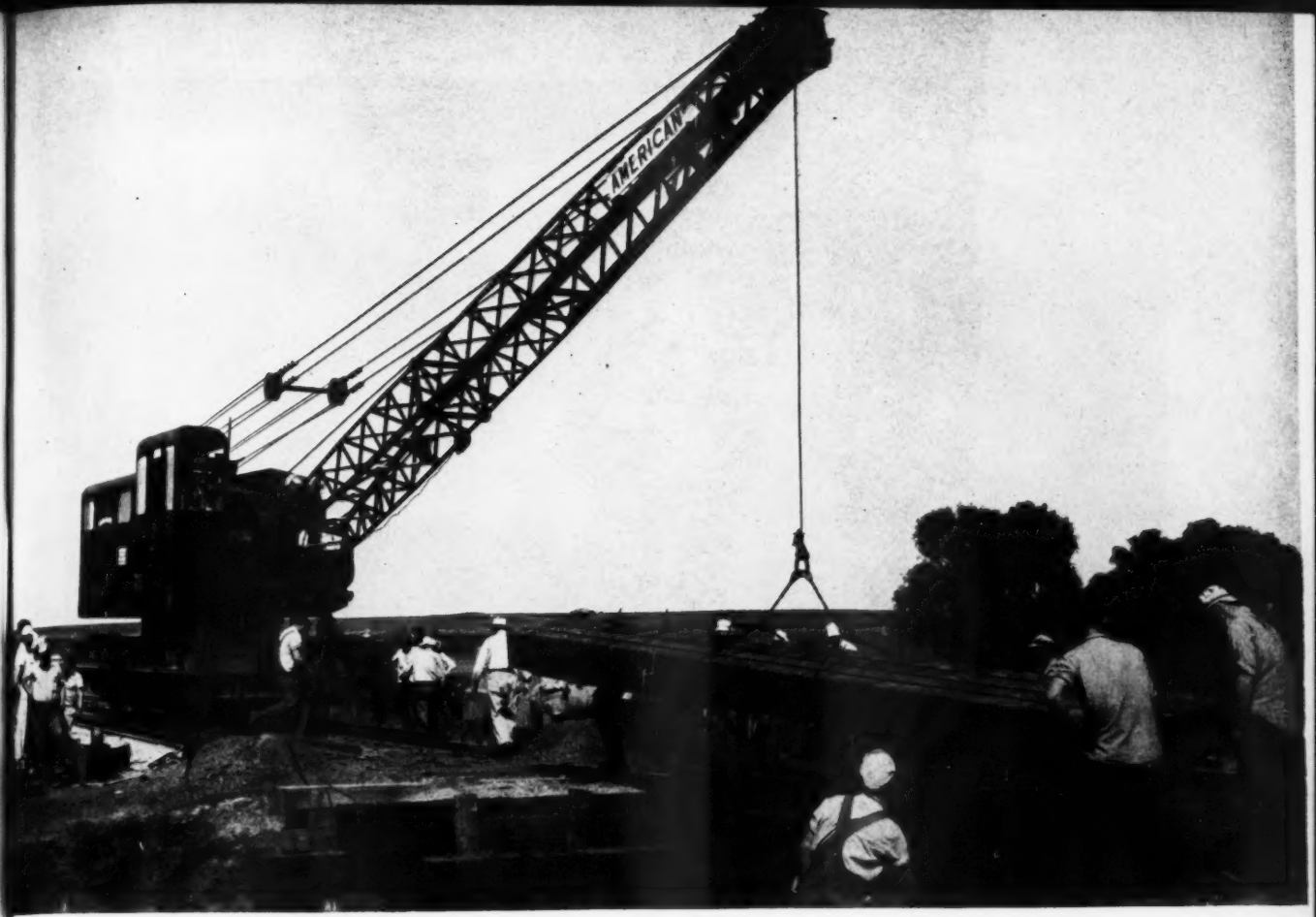
Make proper cut-off

By R. A. Youngblood
Process Superintendent B&B
Central of Georgia
Savannah, Ga.

When a bent has not been correctly cut off, one pile may be shorter than the others. The cap will settle under a load until it reaches the short pile at which point the bearing is equalized and downward movement stops. When the load passes off the cap, the cap then raises upward to the bearing point on the other piles.

This can be corrected by cutting off the bent correctly and replacing the cap, with shims inserted under the stringers.

The same condition may exist if one



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or more piles in the bent is not carrying their share of the load due to brooming or not have been driven to specifications.

This may be corrected by shimming until the bent stops driving under load, then cutting off at this point and shimming under the stringers for permanent repair.

The cap may be soft and the pile ends working into it. If this condition exists the cap should be replaced.

Poor pile conditions

By H. E. Booth
Bridge & Building Master
Canadian National
Regina, Sask., Can.

This condition could be caused by a number of different reasons. But the fact that the cap sinks under pressure shows that the pile bearing is not sufficient for the load.

This condition would be caused by:

(1) Insufficient piles for the strength required for the Cooper rating on the bridge.

(2) Insufficient penetration of piles; or piles driven into movable solids.

(3) Piles driven onto rock formation and mushroomed at the bottom.

(4) Piles over-age and some piles decayed below ground, leaving the cap supported by only two or three piles in the bent.

In the first, second and third instances, greater support for the cap can be accomplished by placing a surface footing, providing a solid earth base is available, and by adding posts to the cap from cross timbers on the footing. If there is water or a muskeg condition under the bridge, the added support will have to be given by driving piles on each side of the cap with a corbel under the cap.

In the fourth instance, a footing would have to be placed where possible and the bridge rebuilt—including the driving of piles—as soon as possible.

On territory where I have worked, we have some little trouble with individual piles or whole bents heaving upwards by frost action in the winter time. When this occurs it is necessary to shim the adjacent bents or cut down the heaved piles to the proper level. Sometimes, piles heaved by frost action will go down again when the frost comes out in the following year, but usually they remain high. Then it is necessary that they be cut to level. After one season, this condition can be noted by the supervisor of bridges and in the following years he will know where to cut piles and also where to shim them.

The sinking of bents also sometimes occurs at the ends of bridges with a high approach fill. The approach fill sinks and takes the piles down with it. This can happen when the fill is so high that sufficiently long piles cannot be driven by the ordinary pile driver. These piles have to be long enough to penetrate the natural ground under the fill to be solid enough to support the traffic and not be pulled down by the fill sinking. If, however, the dump bent does sink excessively, a second row of piles should be driven inside this bent and capped to give added support to the end of the bridge.

Renewing under 100 ties per mile

Where tie renewals run 100 or less per mile, is it practicable with today's forces to change out these ties? Explain. If so, what force and what kind of equipment, if any, should be used?

Generally not economical

By D. H. Yazell
Assistant Engineer
Illinois Central
Chicago

Generally speaking, it is not practicable or economical to renew ties where renewals are less than 100 ties per mile. There are two ways to approach this problem. First is from the cyclic replacement average and the other, from the actual economies of removal.

First from the cyclic basis, considering a tie life of 30 years, which is considered by most to be more than liberal, and 3,200 ties per mile, which is average for most Class I railroads. On this basis, the average tie renewals would be 106 ties per mile per year. Since the average cycle is from three to seven years, the average renewals that could be expected at each cycle would be from 320 to 750 ties per mile. It would seem that, if cycle maintenance were used, tie renewals of 100 or less per mile would not occur frequently. In fact, this condition would be rather special and would probably occur only in new tracks or on tracks which have had an extremely heavy maintenance on a previous cycle.

On such tracks of less than 100 tie renewals per mile, I would recommend skipping tie renewals. If surfacing was not needed at this time, I believe it would be advisable to wait until such time that the tie renewals run closer to the average of whatever cycle is being used. Of course, if the track is in need of surfacing or smoothing, this work should be done, omitting the tie renewals. It may be that the cycle on this particular piece of track would need to be reduced for the next cycle to allow for increased tie renewals.

Next, we shall consider the actual costs involved when renewing less than 100 crossties per mile. In the above discussion, we have estimated the average tie renewals to be between 320 and 750 ties per mile in following a cycle maintenance program. Time studies of mechanized tie gangs, where tie renewals have been as high as 600 ties to the mile and as low as 90 ties to the mile, show there is a definite increase in the number of man-hours per tie needed for renewal in the lesser density miles. Generally, the extra time can be accounted for in the extra miles of track over which the tie machinery travels. As tie gangs become equipped with more self-propelled machinery, the traveling will become less of a factor.

There yet may be reasons to justify renewing ties where renewals run less than 100 to the mile. One I can think of at this time would be a case where cycle maintenance is being started and tie renewals are less than 100 in a small percentage of the miles being worked. Another case would be while actually working on a cycle program, where for some reason or another the

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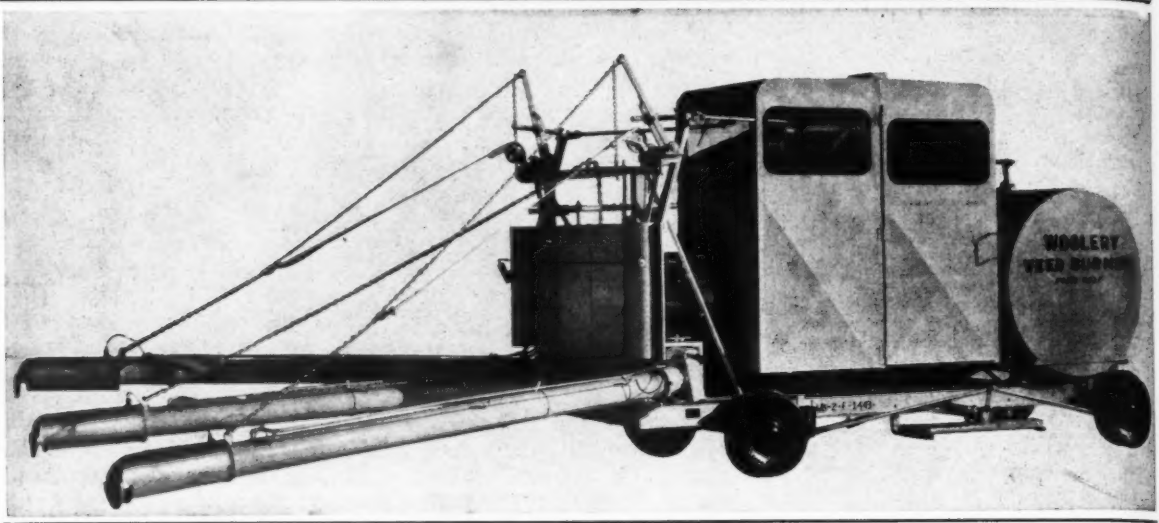

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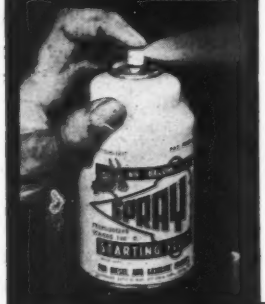

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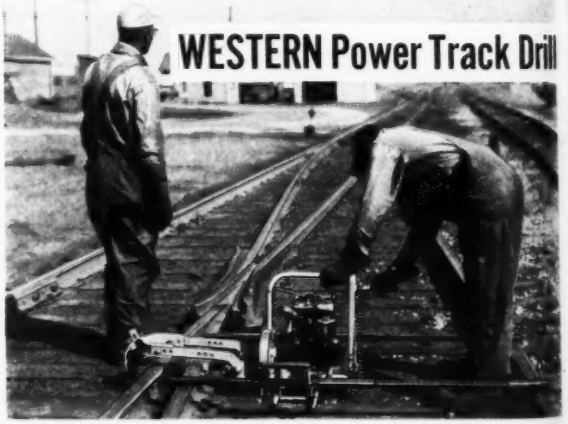

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renewals are less than 100 per mile in specific miles; again only a small percentage of the whole—say for two miles of a ten-mile increment. In these cases, the tie gangs generally must pass over this track to get to the miles of greater density, and they may as well remove the ties as the machinery moves over the track.

Where several consecutive ties are bad or under other special conditions such as ties under insulated joints or in road crossings, removals should be made. In fact, any location where safety is of paramount consideration, ties will, of course, be renewed regardless of method. But such renewals do not economically justify out-of-face use of tie machinery.

Yes, with section force

By F. D. ALLEN
Roadmaster
Canadian National
Capreol, Ont.

Yes, in my opinion these should be changed out or otherwise there would come a day of reckoning when a great number of ties would need changing in the same year.

I would only use the section gang allotted to each section and use all hand tools, such as a short jack of aluminum type, a tie puller designed for hand use, track shovels, a claw bar and spike mauls. I consider any large power tools would be a detriment on work of this type where the ties are scattered out.

Depends on circumstances

By R. H. PEAK
Division Engineer
Illinois Central
New Orleans, La.

If we consider that 100 ties to the mile is considerably less than one to the rail, it becomes readily apparent that there is no urgency about renewing the ties in that mile. This is, of course, based on a uniform distribution of bad ties throughout the mile; that is, on tie renewals at a *rate* of 100 per mile. If the bad ties are bunched, replacement may be necessary.

If a mechanized tie gang is working through a territory where a considerable number of ties are to be renewed and there is an isolated mile having 100 or less bad ties in the territory being worked, it would be worth while to renew the ties in the mile having 100 or less while passing. But ordinarily a territory having a failed tie rate of less than 250 ties to the mile could very well be put off to another year or longer.

If joint ties—yes

By H. B. HENRY
Assistant Engineer—Signals
Baltimore & Ohio
Baltimore, Md.

Ordinarily the answer to this question should be that it would not be practicable to change out these ties. However, there could be cases (which should not exist) where some of this number of ties would be joint ties.

In this case, the joint ties should be replaced by using a portion (3 or 4 men) of the regular tie-renewal gang to make these spot renewals while the gang is in the near proximity. There would be no machinery used. The old method of "digging in" would be the logical method. Naturally, the performance of the tie-renewal gang would suffer, but to get the few joint ties replaced is worth the price in less productivity by the tie-renewal gang for the short period of time required.

The maintenance department on the Baltimore & Ohio is fully mechanized, and consequently the sections are long with a foreman and one man available for inspection and miner repair work. for the short period of time required, Tie-renewal, rail laying and surfacing work are done by mechanized gangs specializing in the categories mentioned. Consequently, the renewal of 100 ties per mile would not be practicable unless some circumstance, as mentioned above, would demand renewals for safety reasons.

Wait until next cycle

By H. W. KELLOGG
Assistant Chief Engineer
Chesapeake & Ohio
Richmond, Va.

In former years, it was the practice on most railroads to install some ties in each mile every year with section forces, the number depending on the condition of the ties and the standard of maintenance desired by the management. In many instances, it was found that an average of 100 ties per mile per year would maintain a good tie condition based on an approximate tie life of 30 years. However, the life of the tie depended on the quality of the timber, ballast, drainage and traffic conditions.

Due to the rising costs of labor and material, most railroads have, or are going to have, a cycle maintenance program for surfacing track and installing ties. This work will be done by mechanized forces with the tie installation being done in conjunction with the surfacing operation or by a separate force working independently.

We can no longer afford to dig in ties by hand, either with section men or extra forces. The mechanized force is geared for production with the thought in mind of reducing the man-hour rate per tie. However, when installing less than 100 ties per mile, the mechanized force does not work at its maximum efficiency due to the long distance between ties.

Records kept over a period of years show that 1.17 man-hours are expended per tie for ties dug in by hand. When ties are installed by a mechanized force at the rate of 300 to 500 per mile, the labor averages 0.80 man-hours per tie. Where 100 ties per mile or less are installed by a mechanized force, the labor averages 1.19 man-hours per tie.

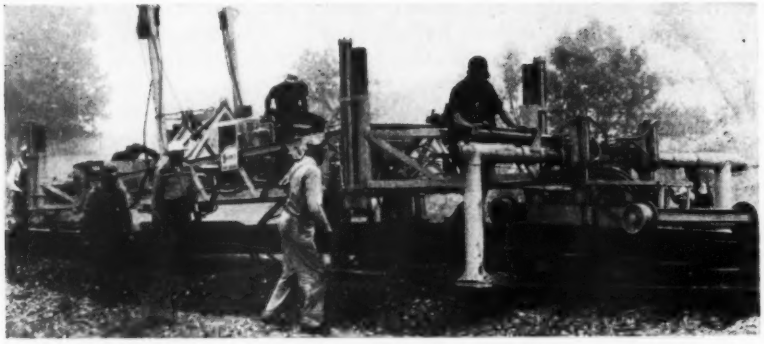
When surfacing track and tie renewals run less than 100 ties per mile, it would be more economical to hold up the tie renewals until the next surfacing cycle. The only exception would be to change out the broken ties or any ties that may be damaged to the extent that they no longer support the rails.

Should be deferred

By R. G. SIMMONS
General Roadmaster
Chicago, Milwaukee, St. Paul & Pacific
Chicago

It is my opinion that, before this question can be answered, consideration must be given to the type of railroad we are talking about. First is the rail section and its quality, then rail anchors, tie plates, type and condition of ballast, and last, the amount of traffic and speed.

For many years I have used a rule of thumb that section forces should take care of tie renewals under 200 per mile. However, in recent years, due



Machine knocks off, ejects ties, lines track behind plow while above subgrade.

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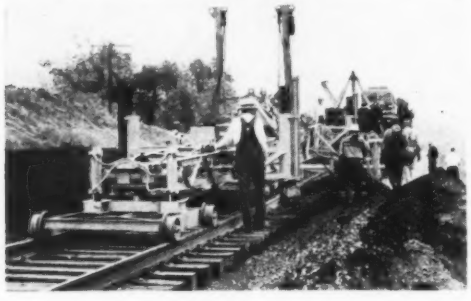
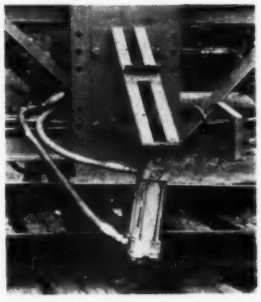
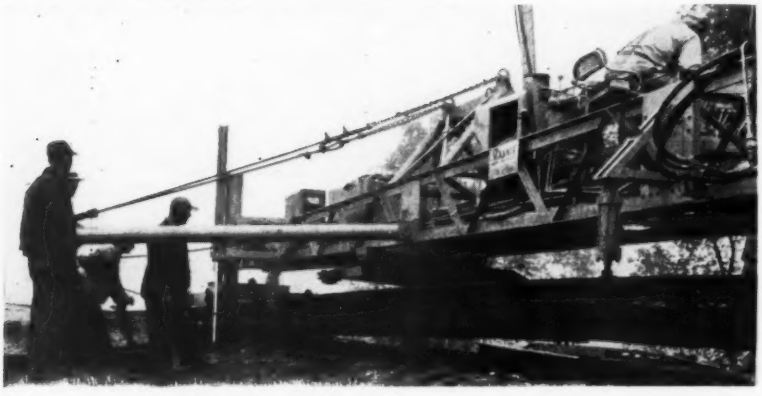




Lining head controlled by levers near rear end where operator observes alinement. One man replaces lining crew.



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What's the answer? (cont'd)

to mechanization and the many tie-handling machines that have been perfected, I think that we should revamp our thinking.

Today, many railroads are using some version of cycle maintenance which calls for crossties to be classified and removed much closer than in the past. Where this method is employed I would say that 100 or less weak ties should be deferred except for broken ties, joint ties, or two weak ties side by side which would affect the current track conditions.

For railroads that rely on section forces to handle a large percentage of their tie renewals, there is an advantage to keep up with their renewals currently regardless of number.

If it is decided to use mechanical equipment in the renewal of crossties, a small gang should be used equipped with mechanical spike pullers, hydraulic rail lifter, tie extractor, tie-bed scarifier, tie inserter, spike driver, and power tamper.

Protecting buildings from vandals

What steps can be taken to protect toilet and other plumbing facilities in stations from vandals? Explain. Would changes in design help this situation?

Keep them locked up

By J. B. SCHAUB
Engineer of Buildings
Illinois Central
Chicago

This is a problem which has received attention more than once and a problem for which there is no simple solution. I also feel that not much can be said on the subject.

The simplified solution, of course, would be to eliminate all plumbing fixtures at all points where thefts and vandalism occur and where circumstances and laws will permit. I believe the next best answer is to keep all toilet rooms locked when supervision is off duty.

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What's the answer? (cont'd)

In many cases, especially in small passenger stations, it is possible to keep the toilet rooms locked, with access being possible only by obtaining a key from the station agent or other convenient key keeper. These suggested solutions apply to the problem at locations where vandalism and thefts by vandals occur.

There is also sometimes encountered the problem of petty thievery by the company's own employees. The suggestion is made that in these instances fixtures be used which are designed as nearly as possible to prevent theft. An example is provided by toilet water tanks that have the tops locked in place.

Is a real problem

By W. F. ARMSTRONG
Engineer of Buildings
Chicago & North Western
Chicago

The protection of toilet rooms and plumbing facilities in stations from vandals is a serious and costly problem at many locations. We do not have a cure-all for this problem but have resorted to the following arrangements to suit particular buildings and locations:

(1) Complete removal of public toilet facilities after discussion and approval from city authorities.

(2) Locking of complete stations during hours when there is no agent on duty. We are only able to do this in a few locations.

(3) Locking of toilet rooms, with key in charge of agent (no access provided to toilet rooms when agent is not on duty).

(4) Coin locks on toilet room doors.

(5) Cooperation with police in making inspections during night.

Changes in design, modernization and better materials have helped to a considerable degree to reduce vandalism at passenger stations where it is required that toilets be kept open to the public.

Since World War II, a number of depots have been remodeled, modernized or newly constructed. Vandalism has been reduced in the locations where this has been done.

It appears as if the general public will treat a neat and clean toilet room with more respect than an old, dirty

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one. In these locations we have not had such damage to fixtures as was formerly prevalent. We still do get some writing on walls, but have found that certain materials, such as ceramic tile, have reduced this problem considerably.

It is important to have good janitor service so that the toilet rooms, once they are improved, are kept in a clean and sanitary condition. It is felt that this will deter abuse.

Tie pads when relaying rail

Is it necessary to remove the self-sealing tie pads from the ties when relaying rail? Explain. If so, how should they be removed?

Do Not Remove

By Engineer Maintenance of Way (Ret.)

Once installed, any properly functioning tie pad should be permitted to run the full course of its service life in track without being disturbed, if at all possible.

If tie pads already in track were installed out-of-face in a previous rail-relaying program, they should have been made a part of a long-range plan whereby there would be no radical change in subsequent rail section, or a considered change of tie-plate size.

Rails weighing 140 lb, 133 lb, and 131 lb per yard have the same width of base and head. If these sections are to be replaced in kind, or one of the lighter with one of the heavier sections, the relaying can be carried out most economically by pulling the line spike on one side of the rail and making use of the existing plate and pad. In such a case, it is assumed that the existing ties were originally properly adzed to provide sound underplate wood with a smooth surface. It is also assumed that the existing tie pads are securely sealed to the ties. If they are not, they should be removed and replaced by a pad that will seal.

This same condition will prevail in the case of 115-lb, 112-lb and 110-lb rail sections, and any out-of-face installations of tie pads should not be disturbed.

If there is to be a radical change in the new rail section to be used, as compared to that currently in track, I would still leave the original tie pads, if securely sealed, in place and get the maximum use out of them. They should be removed and replaced only when they have completely outlived their effectiveness as a seal.

If for any reason, one wishes to remove securely sealed tie pads, which have been previously applied out of face when relaying rail, the most effective manner would be with a power-adzing machine. Such an operation will ruin the pad beyond further use, but manual removal will slow up the rail-laying operations prohibitively.

Properly designed and constructed tie pads can be re-utilized, but at a cost. When tie pads have been applied to new ties in "spot" renewals, the pads can be pried loose and re-used with coating supplied by the manufacturer. In the case of older ties, wood splinters are likely to adhere tenaciously to the pads. Their removal is a costly operation at current rates of pay. Such work could be made a rainy-day project rather than to scrap the pad.

In the case of bridge decks and turnouts, where tie pads have been applied previously on new or properly adzed ties, the pads should be left in place, regardless of the weight of the replacement rail, until they have outlived their effectiveness as a seal between plates and ties. Pads of the proper size should then be installed.

LONGER LIFE FOR YOUR TIES . . .

Flannery Tie Dowels prevent splitting and insure longer cross tie life. Applied while tie is squeezed together by hydraulic pressure, Flannery dowels close all cracks. Made of copper-bearing steel to resist rust and corrosion.

FLANNERY PRODUCTS CORPORATION
RAILROAD SPECIALTIES
P. O. BOX 5103, NEWARK 5, N. J., Telephone MArket 3-0333 / PLANT: BAYONNE, N. J.

WANTED

CIVIL ENGINEER for permanent work in the Engineering Department of a small but busy and strategically electrified railroad. Contact D. F. Lyons, Chicago, South Shore & South Bend Railroad, Michigan City, Indiana.

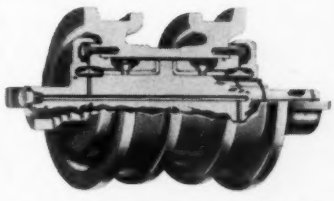
Add up to top performance in a TRAXCAVATOR

WHATEVER THE JOB . . . whatever the conditions . . . there's a Traxcavator to take charge. They have a reputation for outstanding performance . . . low operating and maintenance costs. For this is a digging and loading tool; not just a tractor attachment.

There are three models . . . the No. 933—52 HP, 1⅛ cu. yd. bucket; the No. 955—70 HP, 1½ cu. yd. bucket; the No. 977—100 HP, 2¼ cu. yd. bucket. One will meet your needs. And there's a complete range of quick-change attachments . . . special buckets, bulldozers, forks, the exclusive side dump bucket and the rear-mounted ripper.

Traxcavators are built to last. They have a heavy steel main frame, welded into a one-piece unit. The track roller frame made of box construction absorbs the loads and stresses of tough treatment day after day. Lift arms are made to stand up under the strain of heaviest digging conditions.

All three Traxcavators give you fast action and ease of operation. A fast hydraulic system cuts cycle time and increases maneuverability even in close quarters. Visibility is excellent. The high seat puts the operator on "top" of the work. Operator's compartment is uncluttered with no hydraulic hoses near the seat. Tractor controls are conveniently located for handling ease. Bucket controls are at the right armrest . . . closely spaced for dual operation with one hand.



NEW FEATURES THAT REDUCE MAINTENANCE

The exclusive Caterpillar Oil Clutch provides up to 2,000 hours of service without adjustments—equal to about 12 months' "adjustment-free" operation. **New Lifetime Lubricated Rollers** are factory lubricated; need no servicing until rebuilding. Eliminate on-the-job shutdowns for lubrication. Heat-dissipating oil lubricant is retained by dirtproof floating-ring seal that maintains efficiency through thousands of hours. **Hydraulic Track Adjusters** . . . an ordinary hand-operated grease gun is all that's needed to bring tracks into proper adjustment.

Let your Caterpillar Dealer help you choose the Traxcavator best suited for your job. Get performance facts and figures. And ask for a demonstration.

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

CATERPILLAR

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NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

Binks Airless spraying outfits are available for pumping paints direct from 55- or 10-gallon shipping containers to spray guns.

Facts

you should know about

Airless spraying

Q: *Is airless atomization spraying the answer to all spray painting and coating problems?*

A: No! Not by a long shot.

Q: *Where, then, is airless spraying best used?*

A: It is excellent for indoor and outdoor painting maintenance or production work because there is virtually no overspray.

Q: *Does Binks manufacture airless spraying equipment?*

A: Yes. These rugged, dependable and mobile outfits incorporate the latest developments.

Q: *Why see Binks first when thinking of airless equipment?*

A: Binks offers you a complete line of spraying equipment. Only Binks offers you the opportunity to objectively compare airless with other techniques to select the equipment best suited to *your* requirements. Binks engineering assistance on finishing problems is likewise completely objective.

Q: *How can more facts be obtained on Binks airless units?*

A: Ask your Binks industrial distributor for Binks Bulletin A98-7. Or, call your nearest Binks Branch Office or write direct.

9829

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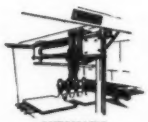
EVERYTHING FOR
SPRAY PAINTING

SPRAY GUNS


AUTOMATIC EQUIPMENT

ELECTROSTATIC EQUIPMENT

Binks Manufacturing Company
3124-38 Carroll Avenue, Chicago 12, Illinois

REPRESENTATIVES IN PRINCIPAL U.S. & CANADIAN CITIES • SEE YOUR CLASSIFIED DIRECTORY

(Continued from page 38)

nized fact that very large stresses are built up in the rails as a result of changes in temperature. For this reason the stabilizing effect afforded by the greater weight of concrete ties is thought to have considerable value. That this factor has a bearing on the present interest in concrete crossties is indicated by the fact that the experimental installations on both the Seaboard and the ACL will be made with continuous rail.

In addition to these three considerations, private enterprise must also be counted as a factor in furthering the cause of the concrete tie. A number of manufacturers of prestressed concrete products around the country, looking for new markets, have been impressed by the volume possibilities inherent in the railroad field if the concrete tie were to win even limited acceptance. Notable among these companies is the American Concrete Crosstie Corporation, Tampa, Fla., an offshoot of Florida Prestressed Concrete Company, Inc.

The firm requested, and obtained, the cooperation of the research staff of the AAR's Engineering Division in developing a design for a prestressed tie. Following extensive tests in the AAR Research Center at Chicago, Mr. Magee and his associates have now settled on a design which is known as "Tie E."

Spacing increased to 30 in

Cost was a primary consideration in the development of this design. One way to minimize the cost would be to increase the tie spacing in track to 30 in from the 20 in now generally used for wood ties, thereby reducing the number of ties required from about 3200 per mile to about 2100. Studies and tests are said to have shown that the resulting increase in flexural stress in the rail, amounting only to about 10 per cent, would be well within the capacity of the heavier rail sections (115-lb RE or more).

To obtain the bearing area in the ballast required with the greater spacing, Tie E was made 12 in wide at the bottom at the ends. It tapers to a width of 9 in at the top. To add to the stability of the tie in the ballast the bottom at the ends was given a

now read about the most efficient use of hydraulics ever applied to a tamper!

the NEW MATISA hydraulic "60" SPEEDTAMPER

TAMPING UNIT DOUBLE CLUTCHES ELIMINATED... NOW CONTROLLED BY REVERSIBLE HYDRAULIC MOTORS!

Less Wear on Man and Machine. Hydraulics eliminate shock loads, gears, clutches. Eliminate fatigue on man and metal!

Less Maintenance. Fewer costly gears and parts to buy—or *wear*. Less repair *time*, lower maintenance *cost*. Standard American components and parts.

More Production. Hydraulically positioned tamping units provide positive action, speedy operation. Assures maximum production.

Safe—Quiet. V-Belt drives with multiple disc clutches eliminate gears and noise, reduce maintenance and serve as safety clutches.

Fast—Efficient. Instantaneous split-head operation increases speed and production for both spot surfacing and out-of-face work.

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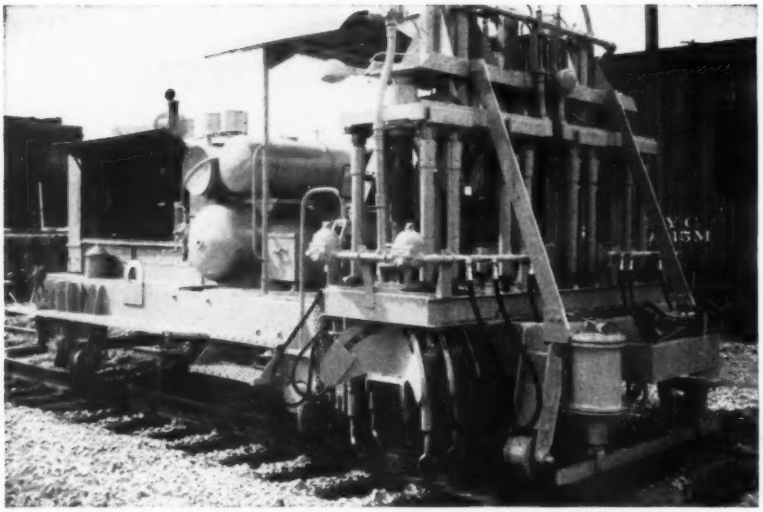


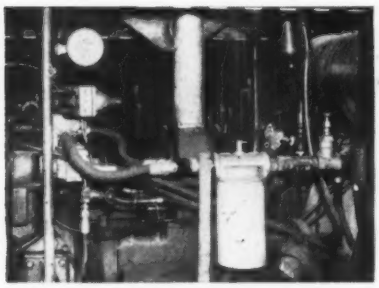
Replacement hydraulic and air lines were installed on this multiple tie tamper.

Aeroquip Replacement Hose Lines Stand Hard Use and Equipment Vibration

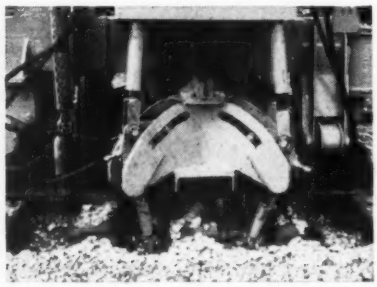
MULTIPLE TAMPER OWNED BY LEADING RAILROAD HELPS TO PROVE THE RUGGED QUALITY OF AEROQUIP HOSE LINES

High quality Aeroquip Hose Lines are selected by many railroads for replacement lines on their heavy-duty equipment. On this multiple tie tamper, for example, dependable Aeroquip Hose and Reusable Fittings were used to replace worn air and hydraulic lines. Field assembled by shop personnel, these hose lines will give long, trouble-free service, and cut future replacement costs.

Get rugged, long-lasting hose lines that can be shop assembled! Order Aeroquip Hose and Fittings from your Aeroquip Distributor, or write us for details.



Aeroquip 1503 Hose Lines are used for hydraulic pressure and return lines on the tie tamper. These lines are subject to vibration.



Air supply lines made of rugged Aeroquip Hose Lines withstand constant vibration and shock, resist damage due to stone abrasion.

Aeroquip

REG. TRADEMARK

AEROQUIP CORPORATION, JACKSON, MICHIGAN

INDUSTRIAL DIVISION, VAN WERT, OHIO • WESTERN DIVISION, BURBANK, CALIFORNIA
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AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A. AND ABROAD

concave shape. For a length of about 3 ft at the middle the tie is wedge shaped on the bottom as a means of preventing a centerbound condition. The length is 8 ft 6 in and the weight is about 550 lb.

Because of the greater compressive strength of concrete compared with wood a tie plate only 5 in wide will be used with Tie E, and will be separated from the tie by an insulating pad, probably of creosoted plywood. At each tie plate the rail will be fastened on each side by a special clip held down by a bolt extending through a hole cast in the concrete. Insulation is provided by a flanged rubber sleeve around each bolt. In addition to serving as a rail fastening the clips are designed to exert enough pressure to prevent creepage of the rail.

Using hand-made ties furnished by American Concrete Crosstie Corporation Tie E has been tested for repeated loading in an Amsler testing machine in the AAR laboratory. In these tests it has been subjected to 150,000 in-lb of repeated bending moment under the rail and has, according to Mr. Magee, withstood 2 million cycles of loading satisfactorily. The fastenings have also been tested in the laboratory's repeated tie-wear testing machine.

The matter of cost

How much will the concrete tie cost? In a brochure published by the American Concrete Crosstie Corporation and entitled "Concrete Railway Ties," the "maximum cost in forseeable future" is given as $9.00 per tie. Presumably, this figure is an estimate based on the cost of manufacture using a special machine perfected by the company, which is said to be able to produce 1000 ties per day. "The machines," says the brochure, "will be strategically located throughout the United States to insure fast delivery to customers in all parts of the country."

Comparative estimates are given in the brochure of the cost of a mile of track laid with wood ties and one laid with concrete ties. According to these estimates, which exclude rails and labor, the cost is about $3,000 more per mile for track laid with concrete ties.

Proponents of the concrete tie are banking on longer service life and

lower maintenance costs to place concrete ties in a favorable position cost-wise relative to wood ties. The service life that might be obtained from the prestressed concrete tie is "questionable at this time," says Mr. Magee, but he adds that "it might not be too optimistic to expect a 50-year life." He predicates this estimate on the use of a strong, dense concrete with air entrainment and on the assumption "that the tie does not become unserviceable in the meantime due to damage from derailments."

On the matter of what happens when a derailment occurs the brochure on concrete ties recounts an experience in Spain when a train was derailed at a speed of 30 mph because of a broken axle under the tender. "The wheels," it says, "ran over an 800-ft section of concrete crossties and not one had to be replaced." The experimental installations of concrete ties will, of course, he watched carefully to note the performance of the ties if a derailment should occur.

The cost of maintaining track laid with concrete ties is another question that can be answered only through experience with the experimental sections. At the present time this is a mater for conjecture only, except for observations made during the laboratory tests. These indicate, according to members of the research staff, that there may be some cost advantage in favor of the concrete tie.

Other questions remain to be answered. These stem mainly from the greater weight of the concrete tie and its other special physical characteristics, and have to do with the problem of distribution, handling and insertion. More information on these aspects of the subject will become available when the quarter-mile experimental installations are made on the Seaboard and the ACL.

Biographical briefs

(Continued from page 10)

absence to make an economic survey for railroad construction for the Peruvian government. Mr. Wilson was promoted to chief engineer, Eastern Lines, at Topeka, Kans., in 1956, the position he held at the time of his recent promotion.

Clifford H. Sandberg, 58, who was recently promoted to chief engineer, Eastern Lines, of the Santa Fe at Topeka, Kans. (announced elsewhere in this issue), was born

7 reasons

why Adams* graders cut your M/W costs

Here's why heavy-duty Adams graders keep blading steadily . . . are always ready for M/W work . . . produce more than other comparable graders. Check these 7 reasons why an Adams handles more off-track grading, dirtmoving, drainage maintenance, snow clearance, etc., at lower cost per day.

1. Engine never overworked

With wide selection of gear ratios, there's no need to lug-down the engine to handle extra-heavy loads. On 80 to 150-hp Adams graders, the 15-speed transmission — including 3 optional creepers — gives you "just-right" speed and power for every operation. And the torque-converter equipped 135 and 190-hp models give you full horsepower "muscle" at any speed . . . the effective workpower of infinite gear ratios. Will not stall . . . cannot be overloaded.

2. Minimum clutch wear

With standard transmission and creeper gears, there's no need to "ride the clutch" in-and-out to get controlled slow speed at full engine power. Clutch is subject to less heating . . . less shock-load . . . less wear.

3. Bearings, axles, last longer

100% anti-friction bearings in engine-to-wheel drive reduce friction, heating, wear. Full-floating drive axles carry no grader weight . . . are not subject to stresses of rough terrain.

4. Less vibration wear

Rubber mounts prevent transmission of engine vibration to grader frame. There's less metal fatigue . . . parts and assemblies stay tighter, wear less.

5. Boxed frame for extra rigidity

Front-to-rear members are 1-piece, heavy steel U-channel, boxed with steel plate, and welded continuously end-to-end. Provides a rugged, rigid blade-mount for sustained accuracy of grading, and long machine life.

6. Gears protected from dirt

Gears that operate blade lift, side shift, and leaning wheels are fully enclosed . . . circle gear is shielded. There's less abrasion . . . less "play" in controls.

7. No leakage of control power

Blade is operated by direct engine power, always moves at constant speed. Control-shaft universal joints are roller-bearing type, enclosed, lubricated for life.

Ask for a demonstration. See Adams' big workpower. See why these rugged machines work more days per year . . . how they can save you money on construction and maintenance of railroad yards, rights-of-way, and access roads. 7 sizes — 67 to 190 hp. Choice of GM or Cummins engine on 6 larger models. Write or phone for full details.

*Trademark G-1741-RR-2/3

LETOURNEAU-WESTINGHOUSE COMPANY
Railroad Sales Division
Peoria, Illinois
A Subsidiary of Westinghouse Air Brake Company
Where quality is a habit

Biographical briefs (cont'd)

at Minneapolis, Minn., and graduated from the University of Minnesota in 1926 with a Bachelor of Science degree in civil engineering. He received a Master of Science degree in civil engineering, in 1929, and a Civil Engineering degree, in 1931, from the same institution. Mr. Sandberg entered the service of the Santa Fe in 1926 as a bridge designer at Chicago. From 1929 to 1943 he served as assistant engineer at Chicago, except for 1940 when he served as bridge construction engineer, Western Lines. Mr. Sandberg was promoted to assistant bridge engineer, system, at Chicago in 1943. He was advanced to bridge engineer, system, in 1958, the position he held at the time of his recent promotion.

Walter E. Robey, 55 who was recently promoted to assistant bridge engineer, system, of the Santa Fe at Chicago (announced elsewhere in this issue), was born at Oklahoma City, Okla., and graduated from the University of California in 1928 with a Bachelor of Science degree in civil engineering. He received a Master of Science degree in 1943, and a Civil Engineering degree in 1946, both from the University of Illinois. Mr. Robey entered the service of the Santa Fe in 1929 as a bridge designer, serving subsequently as assistant engineer and bridge construction engineer. In 1958, he was promoted to assistant bridge engineer, system, at Chicago, the position he held at the time of his recent promotion.

Association News

Northwest Maintenance of Way Club

The next meeting of the club, to be held on November 19, will be featured by a panel discussion, "Are Section Forces Necessary?" The panel will consist of W. J. Cruse, engineer maintenance of way, Great Northern, St. Paul; K. A. Box, superintendent, Northern Pacific, Fargo, N. D.; T. R. Klingel, chief engineer, Soo Line, Minneapolis; S. J. Owens, general manager, Minneapolis & St. Louis, Minneapolis; and R. G. Simmons, general roadmaster, Milwaukee Road, Chicago. A question-and-answer period will follow the panel discussion. The meeting will be held at Coleman's in Highland Park, 2239 Ford Parkway, St. Paul, Minn.

American Railway Engineering Association

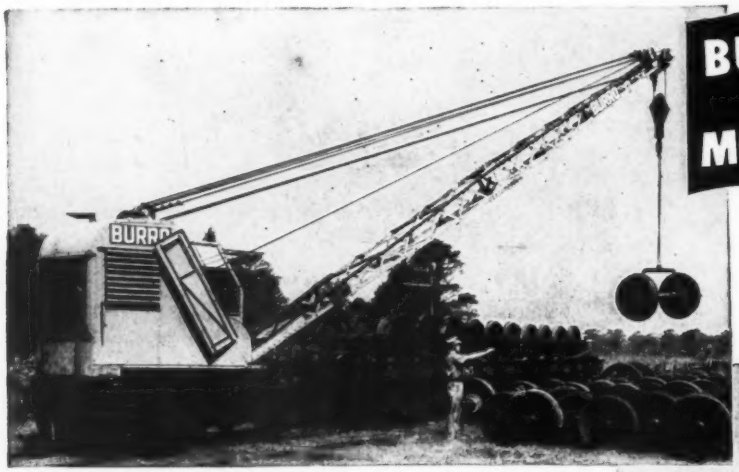
As reported in the October issue, the Nominating committee met at Chicago on September 15 and nominated a slate of officers to be elected at the convention next March. E. J. Brown, chief engineer, Burlington Lines, now senior vice president of the association, was nominated as president. C. J. Code, assistant chief engineer-staff, Pennsylvania, was nominated to the office of junior vice president. R. H. Beeder, chief engineer, system, Santa Fe, now junior vice president of the association, will automatically be advanced to senior vice president.

The directors (four to be elected) are:

C. J. Henry, chief engineer, Pennsylvania, Philadelphia, Pa.; W. B. Throckmorton, chief engineer, Chicago, Rock Island & Pacific, Chicago; J. M. Trissal, vice president and chief engineer, Illinois Central, Chicago; T. B. Hutcheson, chief engineer, Seaboard, Richmond, Va.; V. C. Hanna, chief engineer, Terminal Railroad Association of St. Louis, St. Louis, Mo.; J. A. Bunjer, chief engineer, Union Pacific, Omaha, Nebr.; W. D. Kirkpatrick, assistant to chief engineer, Missouri Pacific, St. Louis; H. J. Fast, coordinator of work study, system, Canadian National, Montreal, Que.

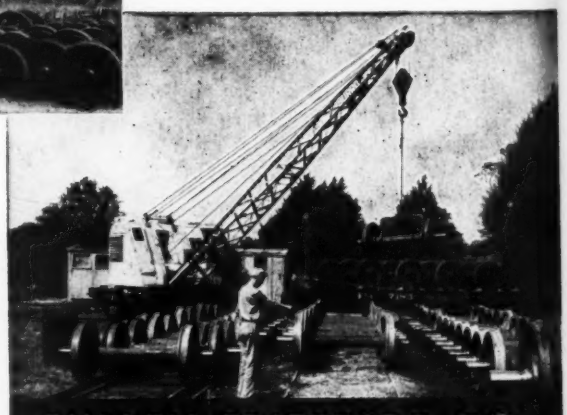
Members of Nominating committee (five to be elected) are:

L. S. Crane, mechanical research engineer, Southern, Washington, D. C.; A. L. Sams, principal assistant engineer, Illinois Central, Chicago; L. C. Collister, manager, Tie and Timber Treating Department, system, Atchison, Topeka & Santa Fe, Topeka, Kans.; W. J. Jones, assistant engineer maintenance of way & structures, Southern Pacific, San Francisco, Calif.; A. W. Munt, supervisor welding and work equipment, Canadian Pacific, Toronto, Ont.; A. S. Krefting, assistant chief engineer-bridges & structures, Soo Line, Minneapolis, Minn.; R. L. Milner, transportation assistant, Chesapeake & Ohio, Huntington, W. Va.; W. H. Huffman, assistant chief engineer — construction, Chicago & North Western, Chi-



BURRO WORK POWER means... MORE EARNING POWER

Unloading car wheels with a Burro. The Burro moved the flat car into position and will haul it away when wheels are unloaded.



This job—handling wheel assemblies in and out of storage—won't support high costs. That's why a Burro is doing the job.

***Any* job—on the line, in the yards, or Stores Department—can be done profitably with a Burro because Burros are fast, efficient workers with hook, magnet, tongs, bucket or dragline. Fast travel speeds and heavy draw bar pull enable the Burro to go to the job in a hurry—and even haul its own cars with it!**

Write for Bulletins and more information about Burro cranes. There is no obligation.

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the improved GAUTIER

the finest in **RAIL ANCHORS**

Made of Alloy Spring steel, the Improved Gautier is one of the heaviest and most rugged rail anchors on the market.

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Move Tools and Supplies
FAST, EASY, SAFELY!

NOLAN
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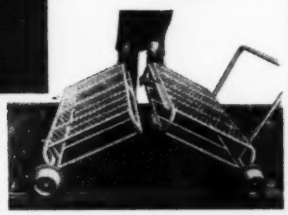


2000 pounds capacity. Takes tools and supplies to the job from truck or bus. All tubular high-carbon steel construction, designed to safely carry heavy loads of ties, rails, supplies and tools.
The car breaks conveniently in the center into two sections for easy handling and transportation. Easily and quickly unhooked or hooked together. Each section can be used for a truck seat.
The deck is heavy mesh-expanded steel. Removable handle can be used at either end. Ball bearing cast steel wheels.
Platform Size 48"x45"
Height Above Rail 8"
Weight 140 lbs. complete

NOLAN TRACK DOLLY

The fast, safe, easy way to transport heavy rails, ties, supplies, tools, rerailers, etc. Tubular high-carbon steel construction. The deck is heavy mesh-expanded steel. Removable handle.

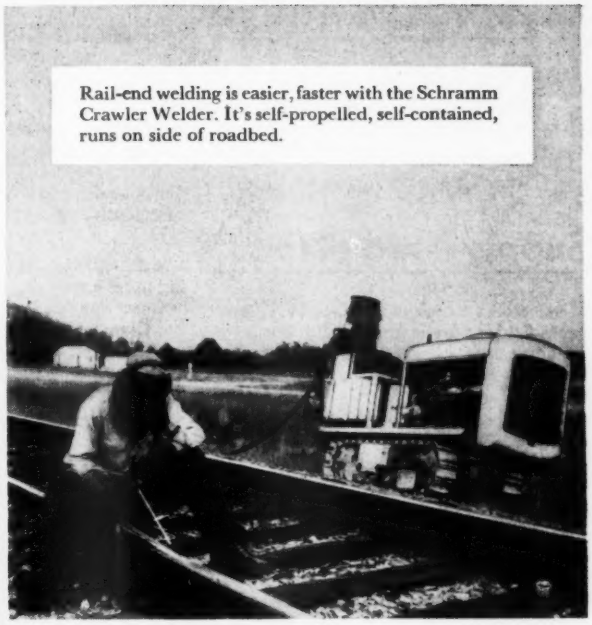
STANDARD DOLLY

Length	Width	Rail	Weight
50½ in.	15½ in.	6⅝ in.	88 lbs.

INSPECTOR'S DOLLY

36 in.	14 in.	6 in.	60 lbs.

FREE CATALOG—Write THE NOLAN COMPANY, 166 Pennsylvania St., Bowerston, Ohio



Rail-end welding is easier, faster with the Schramm Crawler Welder. It's self-propelled, self-contained, runs on side of roadbed.

EASTERN RAILROAD REPORTS: SCHRAMM RAIL-END WELDING...

Reduces maintenance costs... improves road

How do they do it? By welding rail-ends at the rate of 100 per day with the Schramm Crawler Welder. One man drives this self-propelled 300-amp Crawler Welder along with the work—jobs move quicker. There's no need for extra hauling equipment—no need to pull men from other jobs to push or pull. It's compact, small in size, easy to handle—perfect for maintenance-of-way work.

Considering rail-end welding? Think of the Schramm Crawler Welder—the only one of its kind. Write today for full information; ask for your free copy of Form RRM-59.

Schramm, Inc.

MANUFACTURERS OF AIR COMPRESSORS

732 North Garfield Ave.. West Chester, Pa.

Schramm Crawler Welder moves along as work progresses—does not interfere with traffic.

Association news (cont'd)

cago; F. A. Hess, maintenance of way engineer, Indiana Harbor Belt, Hammond, Ind.; B. H. Crosland, chief engineer, St. Louis-San Francisco, Springfield, Mo.

Supply Trade News

A. M. BYERS COMPANY—Douglas F. Williams, field service engineer and in charge of the company's Richmond (Va.) office, has been transferred to the Philadelphia (Pa.) office, according to an announcement by **J. J. Merrill,** division manager at Philadelphia. His new territory covers southern New Jersey and eastern Pennsylvania, including Harrisburg.

COLORADO FUEL & IRON CORP.—George C. Jennings, New York district sales manager, has been promoted to wire rope sales manager at Palmer, Mass., succeeding **A. S. Rairden** who has been promoted to works manager there.

FAIRBANKS, MORSE & CO. — Frederick C. Johnson, manager of the Fair Lawn branch, has been appointed vice president and general manager of the Scale division, one of the four newly created operating divisions of this company, according to an announcement by **Robert W. Kerr,** president.

In his new position, Mr. Johnson will have complete responsibility for the production and marketing of the company's entire line of mechanical and electronic sales.

INDUSTRIAL BROWNHOIST CORPORATION—This company has announced the election of **Warwick J. Hayes, Jr.,** vice president of sales and advertising, to the position of executive vice president and general manager.

LFM MANUFACTURING COMPANY—According to an announcement by **W. F. Rockwell, Jr.,** president of the Rockwell Manufacturing Company, **W. Thomas Gettig,** assistant to the vice president of the Meter and Valve Division, has been appointed vice president and general manager of Rockwell's wholly owned subsidiary, the LFM Manufacturing Company.

MINNESOTA MINING & MANUFACTURING CO.—Paul D. Howard, railroad trades sales supervisor, has been promoted to railroad trades market manager, Reflective Products division, at St. Paul, Minn.

MOTOROLA COMMUNICATIONS — Willis Ditmanson has been appointed national parts and service manager.

NALCO CHEMICAL COMPANY — This company has announced the promotion of **Dr. David G. Braithwaite** to the new position of executive vice president in charge of manufacturing, research and development. The announcement also stated that **Heman R. Powers** would continue as executive vice president in charge of general administration.

At the time of his promotion, Dr. Braithwaite was in charge of the company's program of expansion and diversification within the chemical industry. He formerly headed Nalco's catalyst division.

STANLEY H. SMITH & CO., INC.—J. J. Clark has been appointed vice president and executive assistant of this company, effective October 1, according to an announcement by **Stanley H. Smith,** president. Mr. Clark was formerly with the purchasing department of both the Wheeling & Lake Erie and the Nickel Plate.

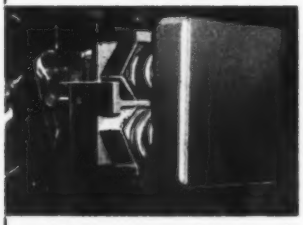
SPERRY PRODUCTS, INC.—Loran C. Morris has been appointed railroad marketing manager.

Obituary

Lewis Thomas, general sales manager of the Q & C Co., died suddenly at Chicago on October 13 at the age of 75 years. Mr. Thomas was well known for his work with various supply associations. He was executive secretary and director of exhibits of the Association of Track & Structure Suppliers and assistant secretary and director of exhibits of the National Railway Appliances Association.

J. W. Eaton, district sales supervisor of Sperry Rail Service at Chicago, died suddenly on September 18 at the age of 45.

Absorbs shock without disturbing the track



Hayco Shock-free Head with patented inner design builds gentler car handling, longer life into your rigid bumping posts.

Five years of in-track performance highlight these facts about the Hayco Shock-free Head: (1) It effectively dampens impact shock—prolongs bumping post life. (2) It gives the draft gears a better chance to function—minimizes damage to cars and lading. (3) It substitutes compressibility for rigidity—tends to keep cars from bouncing, to prevent derailments.

The Hayco Head (applied with a wrench) fits nearly all bumping posts now used. It saves you money every time it is hit. Ask for Cir 115.

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World's Most Versatile Tamper

NEW McWilliams MULTI-PURPOSE 8

A PRODUCTION TAMPER

A SPOT TAMPER

A JACK TAMPER

With ballast compaction equal to the McWilliams Production Tamper, the machine tamps under the tie in sixteen positions—each tool tamping in two places. Speed in production tamping: up to 4 ties per minute. *As a Spot Tamper*, split head with integral jacks assures effective tamping of joints, low spots, switches and in yard and terminal work. *As a Combination Jack and Out-of-Face Tamper*, the machine will operate as a jack tamper in making out-of-face raises, finish tamping ties at jacking points. It then can go back and finish tamp the remaining ties —making possible out-of-face tamping with one machine, an operator and a foreman for sighting the raise. *Ask for details.*

Tools tamp in the same pattern as the McWilliams Production Tamper

Railway Maintenance Corporation

PITTSBURGH 30, PA.

Track Stays up Longer with a McWilliams Tamper

Helps from Manufacturers

The following compilation of literature—including pamphlets and data sheets—is offered free to railroad men by manufacturers to the railroad industry. To receive the desired information, write direct to the manufacturer.

TIE PADS. Racor tie pads are described and illustrated in a four-page folder now available. Properties and features of the pads are explained and described. A table is included which illustrates the economies said to result from the use of smaller tie plates with the pads when installed on an out-of-face basis. (Write: *American Brake Shoe Company, Dept. RTS, 530 Fifth Ave., New York 36, N. Y.)*

EARTHMOVING EQUIPMENT. A new booklet entitled "Let's Talk Iron Horse Sense" is available which describes the application of off-track equipment for keeping the right of way open to traffic. Designated D938, the 8-page, 3-color booklet illustrates, by means of on-the-job photographs, the use of various types of Caterpillar machines for clearing derailed cars from tracks, loading ballast in a tunnel, removing hazardous rock and grading for a new classification yard and relocated line. The Caterpillar 44-ton locomotive is also pictured and briefly described. *Caterpillar Tractor Company, Dept. RTS, Peoria, Ill.*

CONCRETE TIES. A new booklet is available on prestressed concrete crossties, particularly "Tie E." The history of concrete ties, including their use in Europe, is summarized. The objectives behind the design of "Tie E" are listed and design criteria are given. Comparative costs of wood and concrete ties are included, and the manner of fastening rails to concrete ties is briefly described and illustrated. *American Concrete Crosstie Corporation, Dept. RTS, P. O. Box 11476, Tampa 10, Fla.*

CRANE-EXCAVATOR. A new 2-color, 8-page bulletin is available which describes and illustrates the Koehring "Sprawler" Crane-Excavator. Designated K-616, the bulletin explains the mechanical features of the machine. Line drawings are utilized to show the principle of operation of the Sprawler. Its versatility is illustrated through a series of on-the-job photographs. Included is a description of how the unit is stripped down for transporting. (Write: *Koehring Division, Dept. RTS, Milwaukee 16, Wis.*)

PRE-MIXED MORTAR. A four-page bulletin, EPMM-2B, is available which describes the features and properties of Embeco Pre-Mixed Mortar. The bulletin gives the advantages of using the material for making tight joints and masonry repairs. Recommended applications are included as well as illustrated instructions for using the mortar. A table is given which lists the results of comparative compressive strength tests. (Write: *The Master Builders Company, Dept. RTS, Cleveland 3, Ohio*)

MOTOR GRADER. A folder is available which describes and illustrates the new Caterpillar No. 14 Motor grader. Designated Form 33456, the folder briefly explains the features of the new machine including the turbocharged 150-hp engine, oil clutch, dry-type air cleaner, split side-shaft rack, and heavy-duty circle and moldboard. Also included are brief specifications and a list of attachments that are available for use with the motor grader. (Write: *Caterpillar Tractor Company, Dept. RTS, Peoria, Ill.*)

CRAWLER TRACTORS. Heavy-duty attachments for Case utility crawler tractors are described and illustrated in a new 2-color, 4-page catalog. Designated Bulletin CUS-112, it points out the advantages of using the attachments to expand the work-capacities of the tractors. Included are the 5-tooth hydraulic scarifier, 5-ton winch and fairlead, flexible 3-point hitch, power take-off and belt pulley combination and snap-in hydraulic system. Specifications for each are given. The catalog also contains information on guards for protection against rock, snow and timbering hazards, optional grousers and counterweights for various footing and work conditions. (Write: *J. I. Case Company, Utility Sales Division, Dept. RTS, Racine, Wis.)*

STATEMENT REQUIRED BY THE ACT OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946 (Title 39, United States Code, Section 233) SHOWING THE OWNERSHIP, MANAGEMENT, AND CIRCULATION

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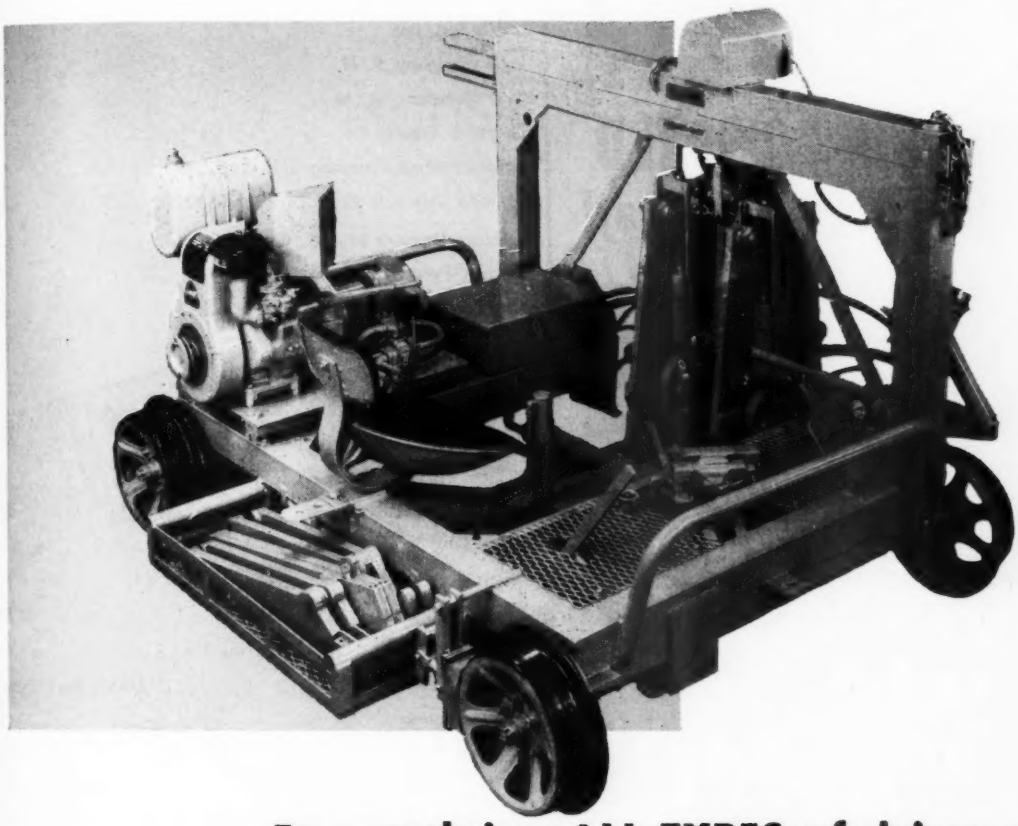
Sworn to and subscribed before me this 28th day of September, 1959.

(Seal) AGNES L. ASHTON

(My commission expires March 30, 1961)

RACINE

Hydraulically operated "Anchor Fast" ANCHOR APPLICATOR



For applying ALL TYPES of drive-on or tool applied hang-on anchors

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CONSTRUCTION AND OPERATION FEATURES

- Smooth hydraulic pressure with adjustable stops, prevents over driving.
- Positive anchor-to-tie application.
- Machine can be used for either single or box anchoring.
- Powered by a 9.2 hp gas engine with clutch and reduction gear.
- Size of unit—95" x 75" x 56". Wgt. 2300 lbs.

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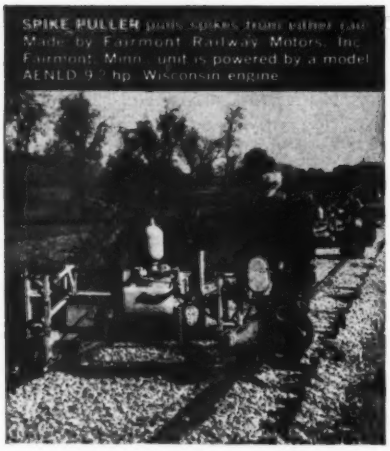
Machinery Division **Racine, Wisconsin**



SPIKE PULLER pulls spikes from either rail. Made by Fairmont Railway Motors, Inc., Fairmont, Minn., unit is powered by a model AENLD 9.2 hp. Wisconsin engine.

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m/w equipment **pays its way!**

TIE SPACING is a one-man operation with the self-propelled tie spacer, built by Pullman-Standard Car Mfg. Co., Chicago, Ill. It is powered by a 30-hp VH4D Wisconsin Engine.

Here's the field-proved reason: Wisconsin air-cooled engines give the most hp-hours of service with the least care! This means that you get more work out of men and machines with fewer shutdowns.

These precision-built work brutes are of heavy-duty design and construction to withstand rough handling in the field. You can count on fast starts and smooth power in sub-zero cold or in 140° F. heat. Their load-lugging high torque power prevents stalling under shock loads. Other full-time service features include thrust-absorbing tapered roller main bearings and four piston rings on all Wisconsin engines — 3 to 56 hp.

Air-cooling provides all-weather dependability. And it minimizes one of the biggest problems in mechanized m/w operations — field maintenance. You have 26 fewer parts to buy and service. You don't have to worry about work stoppage due to freeze-ups, dry-ups, leakage, or clogging of radiators, water pumps, hoses, and other parts used in water-cooling systems.

Mechanize to economize. But be sure to specify Wisconsin air-cooled engines on the equipment you buy. All models can be supplied with electric starting. Write for Bulletin S-237.

WISCONSIN MOTOR CORPORATION

MILWAUKEE 46, WISCONSIN

World's Largest Builders of Heavy-Duty Air-Cooled Engines

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—with reserve power that holds rails and joints

TIGHTER, LONGER!

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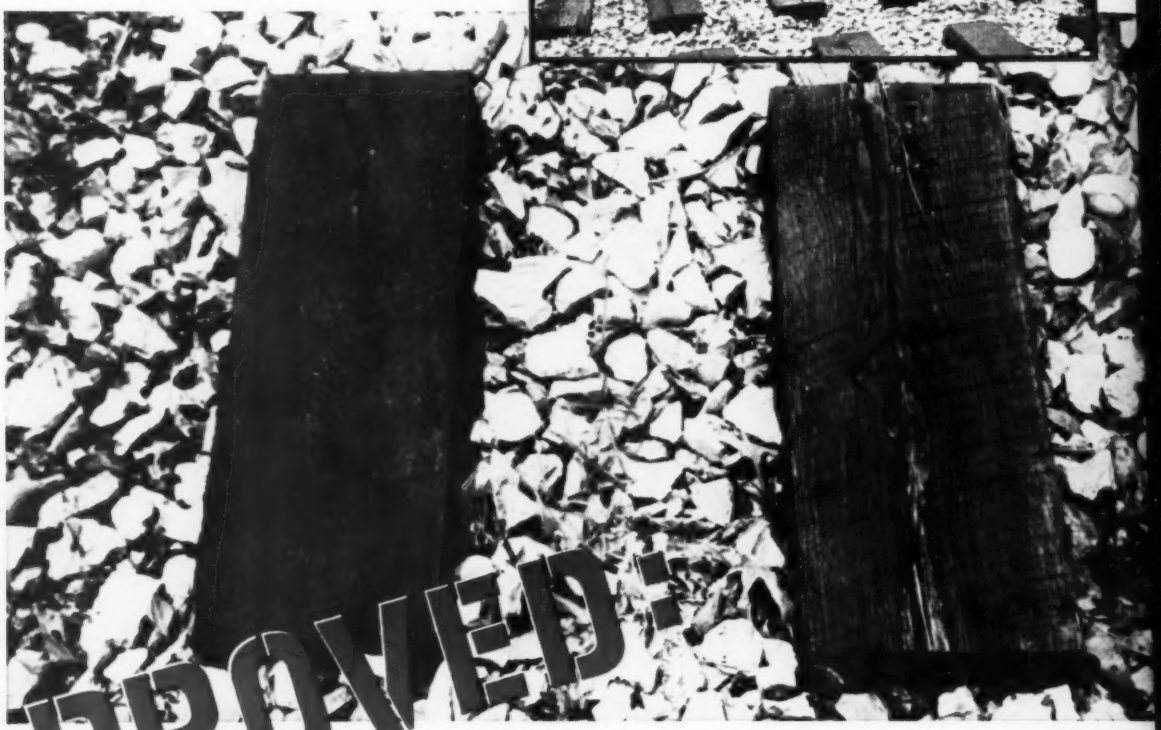
Scores of simultaneous tests were made in this outdoor laboratory by Timber Engineering Co., Washington, D.C. Typical result of seven years' weathering is shown below. The section at left was top-coated with Texaco Liquid Bridge Cement H.



You can get many extra years of use from your ties with Texaco Liquid Bridge Cement H

The two tie sections in the picture were cut from a single new creosote-treated tie. The left section was top-coated with Texaco Liquid Bridge Cement H. Both sections were exposed to weathering for seven years. You can see the result:

The tie treated with Texaco Liquid Bridge Cement H is still like new; the creosoted tie has cracked badly. It's wide open to further damage from frost and rain.

Texaco Liquid Bridge Cement H is easy to use, too. It can be applied with spray equipment, mops or brushes. And low first cost makes it economical right from the start. For more information, call your nearest Texaco Railway Sales Office (there's one in New York, Chicago, San Francisco, St. Paul, St. Louis and Atlanta). Or write:

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Texaco Inc., *Railway Sales Division,* 135 East 42nd Street, New York 17, N. Y.

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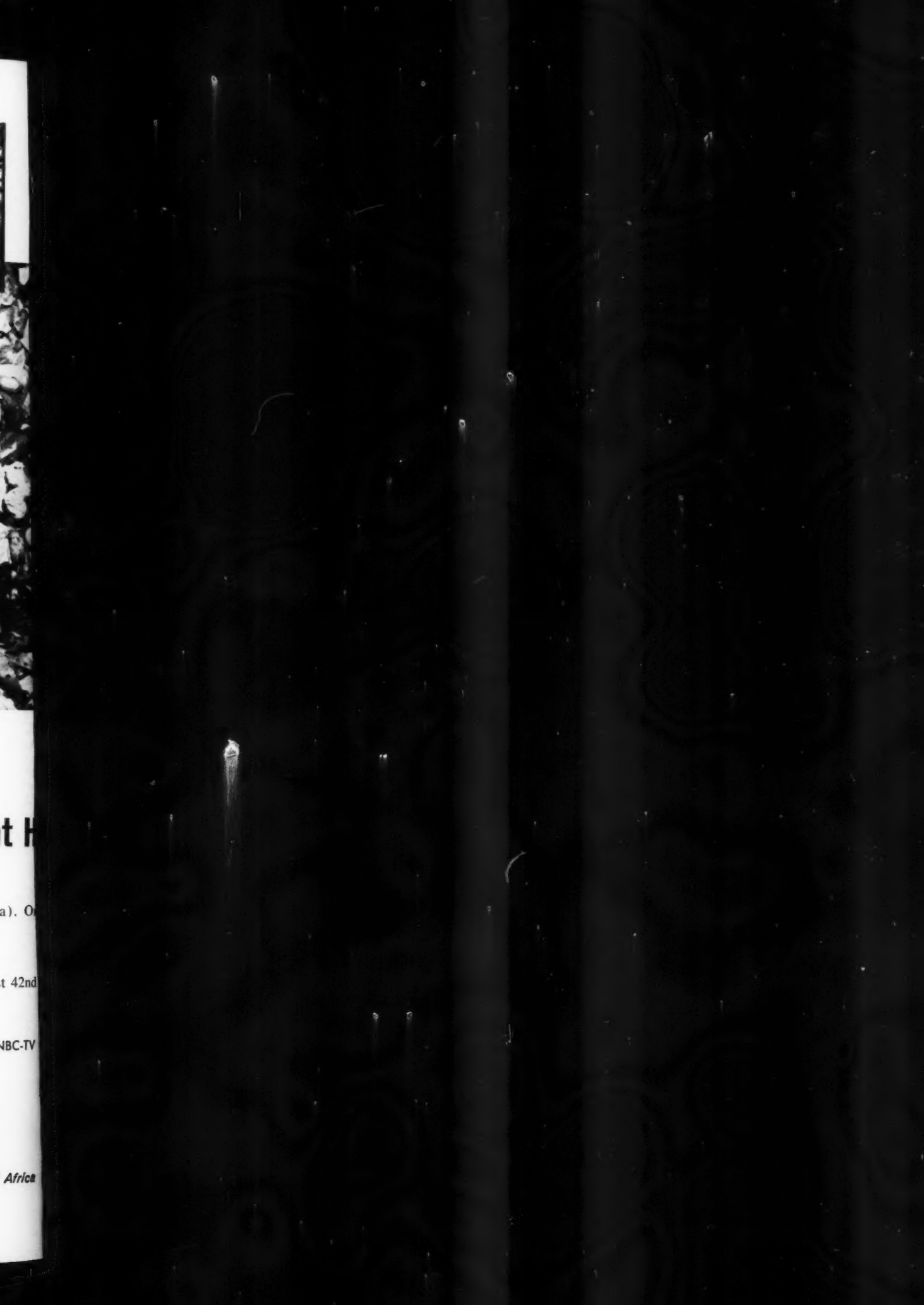
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